DOCUMENT RESUME

ED 471 377 EF 006 239

AUTHOR	Bradley, William Scott
TITLE	Perceptions about the Role of Architecture in Education.
PUB DATE	1996-05-00
NOTE	135p.; Ph.D. Dissertation, University of Virginia.
PUB TYPE	Dissertations/Theses - Doctoral Dissertations (041)
EDRS PRICE	EDRS Price MF01/PC06 Plus Postage.
DESCRIPTORS	Architects; *Architecture; *Attitudes; *Education; Educational Facilities Design

ABSTRACT

This dissertation was conducted to examine perceptions held by those who influence schoolhouse design about the role of architecture in education. Eleven informants--regionally and/or nationally respected educators, architects, and educational consultants--were interviewed and asked what they perceive to be the role of architecture in education. Very generally, the informants agreed that architecture should "enhance" education; however, they varied greatly on what they meant by "enhance." Five metaphors were developed to describe the role of architecture in education: (1) as a facility: the architecture should provide the school's basic operational necessities; (2) as a place: the architecture should provide a meaningful context for the learning experience; (3) as a signpost: the architecture should communicate implicitly that which may otherwise be communicated explicitly; (4) as a textbook: the architecture should reinforce the curriculum at primary, secondary, and tertiary levels; and (5) as an agent: the architecture should be a medium that affects change. Those informants closest to the field of education and furthest from the field of architecture were more concerned with providing basic operational necessities than other considerations. In contrast, those informants furthest from the field of education and closest to the field of architecture were less concerned with providing basic operational necessities and more concerned with applying architecture in creative ways to address issues in education. The dissertation concludes that these goals need not be in opposition to one another and that the metaphors are not mutually exclusive; the more of the metaphors that can be incorporated into the designs of schools, the richer the educational experience could potentially be. (Contains 49 references.) (Author/EV)

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PERCEPTIONS ABOUT THE ROLE OF ARCHITECTURE IN EDUCATION

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Oak Ridge, Tennessee

B.S., Clemson University, 1991
M.Ed., University of Virginia, 1994

A Dissertation Presented to the Graduate
Faculty of the University of Virginia
in Candidacy for the Degree of
Doctor of Philosophy

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Department of Education

University of Virginia

May, 1996

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Abstract

This dissertation was conducted to examine perceptions held by those who influence schoolhouse design about the role of architecture in education. Eleven informants – regionally and/or nationally respected educators, architects, and educational consultants – were interviewed and asked what they perceive to be the role of architecture in education. Very generally, the informants agreed that architecture should "enhance" education; however, they varied greatly on what they meant by "enhance."

Five metaphors were developed to describe the role of architecture in education:

- as a *facility* - the architecture should provide the school's basic operational necessities;
- as a *place* - the architecture should provide a meaningful context for the learning experience;
- as a *signpost* - the architecture should communicate implicitly that which may otherwise be communicated explicitly;
- as a *textbook* - the architecture should reinforce the curriculum at primary, secondary, and tertiary levels; and
- as an *agent* - the architecture should be a medium that affects change.

Those informants closest to the field of education and furthest from the field of architecture were more concerned with providing basic operational necessities than other considerations. In contrast, those informants furthest from the field of education and closest to the field of architecture were less concerned with providing basic operational necessities and more concerned with applying architecture in creative ways to address issues in education. These goals need not be in opposition to one another.

The metaphors are not mutually exclusive. The more of the metaphors that can be incorporated into the designs of schools, the richer the educational experience could potentially be.

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APPROVAL OF THE DISSERTATION

This dissertation, Perceptions About the Role of Architecture in Education, has been approved by the Graduate Faculty of the Curry School of Education in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

Dr. Harold Burbach, Advisor

Dr. Robert Covert

Dr. Carol Tomlinson

Dr. James Esposito

April 22, 1996

This dissertation is dedicated to my grandmothers

Joyce Folsom Garrard

and

Piercie Idella Bradley

without whom this would not have been possible.

Acknowledgements

Mom

Dad

Karen

Hal

Bob

Carol

Jennings

Jim

Maria Fatima

Pam

Informants

Jim

Jon

Katheryn

Blaire

Kurt

Tamara

Paul

and,

of course,

Elizabeth

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CHAPTER ONE

Background and Purpose

Background

The schoolhouse has undergone an architectural evolution. As the everchanging cultural, political, and economic forces affecting our society have influenced its design, its form has matured. Viewed over time, a series of distinct stages, each connected in some way to progressive movements in education or significant events in history, becomes evident. These stages, both separately and as a collective progression, provide insight into the role architecture has played in distinguishing, harboring, and facilitating public education in America over the last two hundred years.

According to William Cutler (1989), the schoolhouse became a necessary component of early American education when the idea of "schooling" first became synonymous with learning. Figure 1-1 shows a drawing of a typical schoolhouse dating from the late 18th Century (Guilliford, 1991). Vastly different from learning through apprenticeship, public "schooling" in America called for a more generalized curriculum aimed at educating citizens for a democratic society. Needed was "...a

discrete place to house teachers and learners in a dignified, orderly fashion" (Cutler, 1989) separate from work and family. The schoolhouse arose out of this need and lent permanence and prominence to this new notion. By carving a place for the school within the urban fabric developing on the American frontier, architecture played a significant role in distinguishing "schooling" as a credible alternative to apprenticeships.

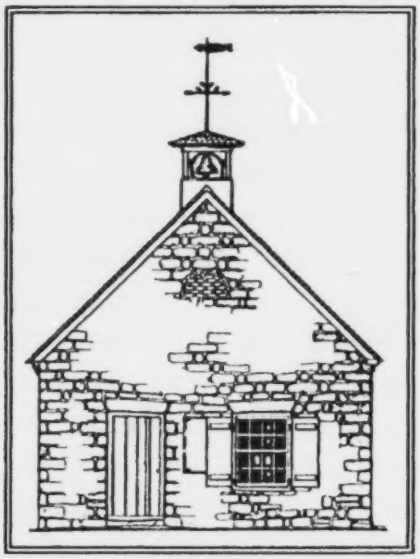

Figure 1-1. Vernacular Stone Schoolhouse (c. 1790)

Early schoolhouses were simple, one-room, sparsely furnished buildings whose primary function was to provide shelter. Windows emitted light and a pot-bellied stove radiated heat while students sat on

benches receiving uniform, ungraded instruction from one teacher. Figure 1-2 shows the interior of such a schoolhouse (Guilliford, 1991). Although cloudy days, cold winters, shoddy building materials, and poor construction made learning conditions in these simple structures less than ideal (Gulliford, 1991), the schoolhouse became a fixture as the concept of "schooling" became more widely accepted.

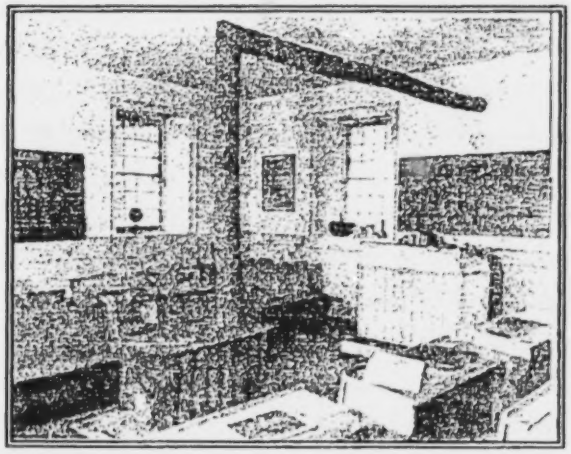

Figure 1-2. Interior of Thomas Filer Schoolhouse (c. 1820)

The one-room schoolhouse prevailed throughout the nineteenth and into the twentieth century in rural America, but in towns and cities a new form of the schoolhouse began to evolve. First, attention was given to assuring better building materials and construction for schoolhouses. Second, teacher platforms, coat closets, and recitation

rooms were added. As the population expanded and a town outgrew the small building, a second room was added, creating a larger, two-room schoolhouse (Graves, 1993). As public education spread, the role of architecture evolved from that of helping to legitimize "schooling" to that of providing a sheltered, safe environment in which to learn. Without the convenience of modern amenities (e.g., uniform heat, ventilation, sewage, etc.) in most schools, this challenge would preoccupy school designers into the twentieth century.

An important step in the continuing evolution of the schoolhouse was the unification in the mid-1800's of the reading and writing schools, "...which functioned independently of each other, although situated in the same building" (Graves, 1993). The floor plan of these unified schools consisted of two classrooms separated by two smaller recitation rooms. While the schools operated independently of one another, unification under one roof suggested the possibility that the schoolhouse could expand by means other than population growth. Over time, the curriculum, and along with it the schoolhouse, grew to include history, grammar, composition, and bookkeeping (Graves, 1993).

The placement of students into "grade" levels and the establishment of a logical system of promotion was a final step leading to the creation of the "graded" school. Boston's Quincy Grammar School, erected in 1848, is regarded as the first fully graded public school

building in the United States (Graves, 1993). The four-story building provided space for 660 students. The square floor plan allocated four classrooms, each 31 by 26 feet to accommodate fifty-five students, to each of three grades. Grades were separated by floors with the auditorium located on the top floor and the administrative offices occupying the basement.

The Quincy Plan, as it came to be known by school boards across the country, served as the model during the middle of the nineteenth century for schoolhouses built from New York to San Francisco (Cutler,

1989). While facades changed according to the preference of the local community, the basic form of the schoolhouse remained unchanged for several decades (Graves, 1993). By the end of the century, schoolhouse design was on its way to becoming centralized and standardized (Cutler, 1989).

It was not until reformers began to question the regimented instruction taking place in schools that schoolhouse design began to further evolve. John Dewey's new approach to education based on learning through creative participation called for specialized classrooms to accommodate a curriculum broadened to include science applications, arts education, and vocational training. The Gary Plan, developed by Gary, Indiana, Superintendent William W. Wirt, was an important factor in helping to achieve Dewey's more diversified program. Adopted by many school districts between 1912 and 1928 (Cutler, 1989), Wirt's "work-study-play" school provided homerooms for basic instruction, plus gymnasiums, workshops, a playground, and an auditorium. According to Cutler (1989), "...the organizational and architectural design of a work-study-play school made possible a full range of educational experiences."

In many cases, the interiors of preexisting buildings were modified to provide for the new spaces defined by the Gary Plan. While the outward appearance of the schoolhouse remained unchanged, an important step occurred in the evolving role of architecture in education.

By providing specialized spaces for a specialized curriculum, an interdependent connection was made between the curriculum and the building that housed it (Cutler, 1989).

Up to this point, architects, with notable exceptions, had not yet become involved in schoolhouse design. Changes in form and plan were implemented by innovative educators. To the degree that architects were involved, they were employed as structural engineers or decorative facadists. As Cutler (1989) points out, this occurred for a reason. "To educators striving for recognition and respect, the practice of school design seemed well suited to centralization and professional control. "As a group, professional architects would not become involved in the design of schoolhouses until after the Great Depression (Castaldi, 1994).

Henry Barnard wrote that the "schoolhouse should be a temple, consecrated in prayer to the physical, intellectual, and moral culture of every child" (Barnard, 1848). The schoolhouses being erected in rapid succession for the first four decades of the twentieth century were far from temples. Though the standardized building codes developed by educators dramatically improved health conditions within schools, they did not, and necessarily could not, tap the potential of architecture anymore than school curricula designed by architects could tap the potential of students' minds. The quantitative solutions to the problems bore no relation to the qualitative.

> But the savings to be achieved by standardization were difficult to ignore, and in many school districts imagination and flexibility in building design and construction were sacrificed to economy. Floor plans were duplicated time and again, while exteriors so lacked originality that the schoolhouse became a stereotype in American society (Cutler, 1988).

While it may seem that educators were to blame for this, Roth (1966) suggests that circumstances in the field of architecture occurring at the same time prevented architects from applying themselves properly to the problems of design.

> During the second half of the 19th century the decline in architectural conception and creative thought was rapidly approaching the lowest possible level.... The architects of the period held on to certain vague traditions which, in no way, corresponded to modern times. The fact that school building became a state concern, furthered their erroneous development from the start. The architect was automatically compelled to confer upon these public buildings the prevailing pathos of representative and monumental appearance.

Where architects were employed, as they necessarily were to provide a sound structure, they applied decoration to facades to make buildings unique, without giving thought to the unique purpose that it served. Roth (1966) continues,

> Forms and details of all styles were regardlessly borrowed here and there and put together in some new shape wherever the architect's imagination failed him.... Accordingly, schools were either castles or palaces and their architectural style either Gothic, Renaissance, or Baroque, or a combination of all styles. Whatever their shapes or forms were, they in no way resembled a school.

The effects of this neglect by architects were out-sized schools that contained non-functional, poorly arranged spaces that were uncreative in their designs and unsuccessful in contributing to the educational experience. As Roth (1966) concludes,

> The child's own scale was not taken into consideration, either practically or emotionally. Out-sized entrances, corridors, stairways seem to have been particularly selected by the architect for his "artistic" effects with the well-meant aim of contributing to the child's education.

In 1940, in Winnetka, Illinois, the application of architecture to education changed dramatically. Superintendent Carleton W. Washburne met with architects Lawrence Perkins and Eilel Saarinen to discuss his ideas for a new progressive school and, as a result of their collaborative effort, Crow Island Elementary School became the first school in which architecture was used as an effective medium for enhancing the teaching and learning experience. According to Graves (1993),

> By the time Crow Island was finished, the participants in the process had swept away all traces of the Victorian schoolhouse; gone were the imposing scale, formal architecture, and rigid organization of classroom cells within a two- or three-story box.

In their place stood a one-story, residential-scale schoolhouse with classrooms assigned to wings, each complete, self-contained, and with its own identity, welcoming students into a warm, personal, and

intimate learning environment. Figure 1-4 shows the front of Crow Island Elementary (Graves, 1993).

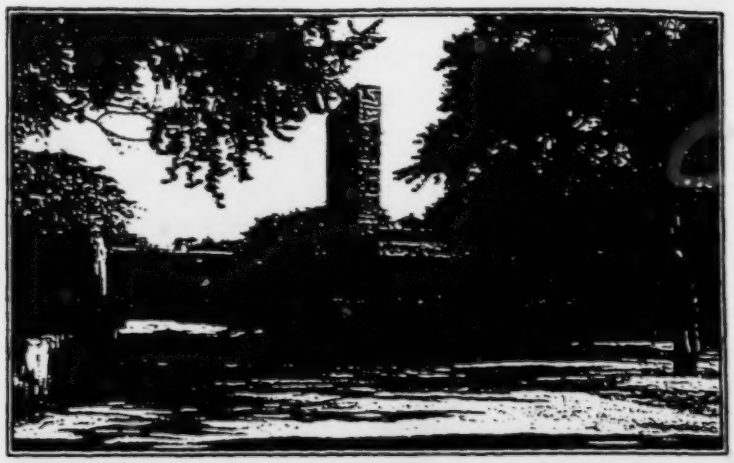

Figure 1-3. Crow Island Elementary School

Architecture played an important role in education by distinguishing "schooling" as a legitimate activity, harboring teachers and students, and facilitating the implementation of a broader curriculum. Architecture as a craft, however, did not begin to play a significant role until the construction of Crow Island Elementary. Because of this successful collaboration between educators and architects, architecture was recognized as a partner in the educational

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process, the role of architecture broadened dramatically, and attention was given to unlocking its potential as a component of the curriculum.

The onset of World War II prohibited educators and architects from building on the lessons learned at Crow Island Elementary. While schools continued to operate in the United States, the attention of the nation was focused overseas. Funds that had been dedicated to the construction of new schoolhouses were diverted to finance the war effort. A critical moment in the evolution of the schoolhouse that might have led to a new understanding of the role of architecture in education became instead a period of arrested development.

After the war school construction reached its highest level in history when "baby-boomers" flooded schools in unprecedented numbers in the 1950's and '60's. The role of architecture in education diminished as architects, scrambling to meet the urgent demand for new schools, focused their efforts on designing for economy and efficiency (Graves, 1993) rather than matching program and plan. Many schoolhouses being built reverted to plans used a half century earlier. Where Crow Island Elementary was used as a precedent for design, it was modeled in form, not in spirit. "Clones," as such schools were called, bore the outward appearance of applying architecture effectively, but, in the interest of time and money, were in truth ill-suited to the curriculum they housed.

> ...the savings to be achieved by standardization were difficult to ignore, and in many school districts imagination and flexibility in building design and construction were sacrificed to economy. Floor plans were duplicated time and again, while exteriors so lacked originality that the schoolhouse became a stereotype in American society (Cutler, 1989).

Many of these schoolhouses, with the aid of renovations in the 1970's and '80's, are still in operation today.

Since the early '60's, fluctuating trends in education have caused the schoolhouse to assume many new forms. In the late '60's, the "open-plan" was imported from England, and interior walls in many schools were knocked out to encourage self-directed, student-motivated learning (EFL, 1973). In response to the energy crisis of the '70's, attention focused on conservation, and many schools became "windowless." After schoolhouse construction slowed in the '80's (Murphy, 1991), "home-based" schools partitioned into "communities," "neighborhoods," and "families" began appearing in the '90's (Ritterspacher and Hill, 1990; Shields, 1993).

While many school districts maintained the status quo during this period of dynamic change, in those that did not the schoolhouse evolved more rapidly and dramatically than at any other period in its development. In communities where change was sought, architecture became an advocate for reform – elsewhere, its role in education atrophied.

Problem

Architecture has served education in many capacities; however, today, over 200 years after the schoolhouse began its evolution in America, its role in education is not clear. The schoolhouses, which once stood as "... a crystallized expression of the curricular objectives and activities..." (Cutler, 1989), has been subjected to demands for economy and efficiency and reduced to a shelter for learning. Consequently, the potential of architecture as an effective medium and partner in the educational process remains largely untapped.

According to Henry Halsted (1992), organizer of the Architecture and Education Conference held at Crow Island Elementary School, outdated design is hindering the progress of education. Halsted asserted that, "The emerging new format of education for the 21st Century is struggling to be born in 19th Century-style schoolhouses." As a result, educational programs are being constrained by the architecture in which they exist (Day and Day, 1995). If architecture is to become an effective medium and partner in the educational process and encourage the progress of education, its role in education must be clarified.

Purpose

A necessary step toward clarifying the role of architecture in education is gaining a better understanding of the perceptions held by those who influence schoolhouse design. In the past this group has included, very generally, educators and architects, but today schoolhouses are designed by specialists. These specialists include educational consultants, district facilities planners, and architects dedicated to schoolhouse design.

The purpose of this dissertation is to examine the role of architecture in education as perceived by those who influence schoolhouse design.

Significance of the Research

New school construction is increasing at an unprecedented rate. According to educational consultant Ben Graves (1994), current demographic and enrollment figures suggest that "school construction and renovation will be necessary for as far into the future as we can currently project." This increase in construction will provide educators and architects with the opportunity to redefine the role of architecture in

education. Educators and architects who recently gathered at the Architecture and Education Conference expressed concern about the lack of attention given to the relationship between architecture and education. Conference organizer Henry Halsted (1992) wrote,

> Only a handful of educators, architects, school facility planners, parents, members of school boards and other government bodies, and communities are giving any thought whatsoever to how school facilities need to change in concert with the changing roles and operations of schools.

In order for educators and architects to take advantage of the opportunity available to them, research must be done to study the relationship between education and architecture. This dissertation examining the role of architecture in education will lend an important voice to their conversation.

CHAPTER TWO

Review of the Literature

The Background in Chapter One provided information from the literature about the role architecture has played in American public education up to the present time. It indicated that architecture helped to distinguish "schooling" as a legitimate activity, harbored teachers and students, facilitated the implementation of a broader curriculum, and, with the design of Crow Island Elementary School in 1941, provided a more meaningful context in which learning could occur. Information was also provided showing that, for a variety of reasons – the world war and the demand for economy and efficiency in construction foremost among them – the role of architecture in education began to diminish soon after Crow Island until now when it is unclear how education might be served best by the built environment. The review of the literature will attempt to examine how the role of architecture is perceived by current practitioners.

It is difficult to discern from the literature perceptions about the role of architecture in education. An electronic search of the library's database using the keywords "perception," "education," and "architecture" with "and" modifiers produced one nontopical reference.

Another search using the keywords "role," "education," and "architecture" with "and" modifiers produced twenty-three references, most of which addressed the education of architects and none of which were relevant to this study. Similar searches using root word extensions (e.g., "perceptions," "roles," etc.) and synonyms (e.g., "school," "design," etc.) in various combinations were equally unsuccessful.

Because no relevant inclusive references were found, the search was broadened by removing the keywords "perception" and "role," which imposed the greatest restrictions, from the search string. A revised search using only the keywords "school" and "design" with an "and" modifier produced over 1,600 references related in some way to both education and architecture. The subjects of these articles ranged from concerns about asbestos and radon contamination to case studies about innovative designs and construction techniques to interviews with architects about their educational and architectural philosophies to editorials about the impact that changing educational philosophies have on design. What can be learned from the literature about the role of architecture in education must be inferred, very generally, from the sum of the comments embedded within these articles. Comparisons will be made between the architectural literature and the educational literature to determine where the emphasis lies within both fields.

Architectural Literature

> *Many architectural exhibits and competitions tout certain projects as the best schools in the country. Usually, however, these competitions end up as glamour contests. The projects are beautiful and inspirational, but there is little discussion as to how they respond to the educational program.*
>
> – *Gaylaird Christopher*

Christopher (1990) succinctly summarizes the architectural literature. A survey of several articles (see e.g., Crosbie, 1990; Saldarriga, 1989; Pearson, 1993; Stein, 1993; Linn, 1993; Hoyt, 1993; and Murphy, 1991) reveals an emphasis on aesthetics with little or no mention of the education that occurs within the building.

Stein (1993) writes,

> The composition of horizontal load-bearing brick blocks of classrooms, punctuated by the more sculptural forms of the library and theater, responds as much to the characteristics of the sprawling 72-acre site as to any notion of regional style.

Crosbie (1990) writes,

> Once inside, the seemingly modest building explodes – it literally appears to be collapsing – as an interior bridges swings out and around a tilting, sliding wall of glass. The glass wall's struts, which disappear above the ceiling and shear away from the bridge, seem to have fallen through the building, converging at some point in the earth far below the courtyard paving.

Pearson (1993) writes,

> A steel-framed structure with concrete-and-metal-deck floors, I.S. 218 presents two faces to the city: a great curving facade on Broadway that serves as the main entrance to the school and a less formal side entry enlivened by a colorful mosaic mural where

> most students arrive. The Broadway elevation embraces a somewhat austere semi-circular courtyard that looks across the street toward Fort Tryon Park.

Smith (1995) writes,

> Rising dramatically from the arid, mesquite- and sagebrush-dotted flatlands of South Laredo, the colorful, pyramidal shapes of the Cigarroa High School poignantly recall the historic culture of nearby Mexico.

These samples are representative of the focus on the appearance of the schoolhouse that characterizes the architectural literature. Rarely was the educational program or its relation to the design mentioned. While it would be unfair to infer from this that the architects who designed the schools placed an emphasis on aesthetics over the educational program, the fact that the authors/reviewers clearly key on one over the other may suggest one or two things.

The first implication appears to be that the role of architecture in education is to provide a pleasant, if not inspirational, environment in which to teach/learn. Underlying this perception is a belief in the power of the medium to have a positive effect on whatever activities are housed within it.

The second implication appears to be that the architecture in all cases addresses the curriculum; therefore, no mention of the educational programs need be made. Underlying this perception is the false premise that there is one universal curriculum – to educate/learn – to which every design is applicable.

Educational Literature

The philosophy should be exemplified in the building itself.
– Ritterspacher and Hill (1990)

In contrast to the architectural literature, the educational literature keys on the relationship between the architecture and the educational program it houses, approaching the topic from many different viewpoints. The implication is that the role of architecture in education revolves around the educational program.

Christopher (1990) writes,

> Educators at exemplary schools have typically developed a very strong educational program with definite goals and objectives. The architect can then develop a design tailored to the program. The design is an outcropping of these needs, transcending and symbolizing the educational program.

Gilbert and Taylor (1989) write,

> A well-designed learning environment should be based on an architectural programming process that uses the development and curricular needs of modern users and not on preconceived square footage ideas of what a school was like in the past.

Also indicative of this is the frustration expressed with architectural design that opposes, and thereby hinders, the educational process. "One should never force function into a predetermined form" (Faust, 1980).

Bennet (1985) writes,

> Middle schools are seldom constructed in consonance with the school's program structure. A hand-me-down facility built in some other time for some other purpose would be much more likely. The typical result is that the most desirable program is not implemented because there are too many unalterable realities. At best, an awkward accommodation is made.

Hanlon (1984) writes,

> Unfortunately, in all too many instances, the physical facility impedes learning and teacher's effectiveness is diminished by an old or poorly designed building. The results of such situations are frequently reflected by students through apathy, discomfort in, and disrespect for the surroundings.

Day and Day (1995) write,

> The traditional double-loaded corridor with equal-sized classrooms on both sides of a long hallway does not lend itself to tomorrow's teaching and learning styles. Educators, planners, and architects must show the public that high schools need to be transformed.

Also apparent in the literature is a frustration with architecture's refusal to evolve in concert with changing educational practice.

Graves (1993) writes,

> The same floor plan with its 800- to 900-square foot self-contained classroom is still the most common arrangement today. The total plan – design response – is essentially the same, although the facade varies according to the local community's or architect's preference.

Jilk states (Shields, 1993),

> The appearance of most schools has been arrived at by a lateral process. There were things about the one-room schoolhouse that recommended it, but all that's been done is physically expand it to the left and right.

The degree to which architecture's role was diminishing to the detriment of the educational program was also a theme.

Smith (1987) writes, "Strict cost controls and speed of construction still, too often, seem to be bigger concerns than what you achieve with the monies spent."

Cutler (1989) writes,

> ...the savings to be achieved by standardization were difficult to ignore, and in many school districts imagination and flexibility in building design and construction were sacrificed to economy. Floor plans were duplicated time and again, while exteriors so lacked originality that the schoolhouse became a stereotype in American society.

Hathaway (1988a) writes, "Instructional spaces often convey the mass production, assembly-line ethic. Classrooms are usually standardized and exhibit an institutional nature."

In support of the educational program, Christopher (1990) suggests that "the building itself can also become a teacher." Leonard (1992) provides an example of how this occurred at a middle school where the adjacent natural park and wetlands area were incorporated as outdoor classrooms.

> A well-coordinated approach to managing the [design] process can create an environmentally-balanced solution to site requirements and enhance educational programs by incorporating environmental opportunities with the curriculum and using the site as a laboratory/classroom.

The inferences that can be drawn from the sum of these statements suggest that the role of architecture should accommodate the

educational program. Underlying this perception is the belief that a poor match between the architecture and the education will produce negative results, and a good match between the architecture and the education will produce positive results. To determine the validity of such beliefs, several research studies have been conducted to determine the effects of the built environment on learning.

Studies reveal that the built environment can have a positive effect on learning outcomes. A quantitative study conducted by Bowers and Burkett (1988) examined the effects of the physical environment related to school achievement as measured in the health, attendance, and behavior of students from two schools, one built in 1983 and one built 1939. Aside from the differences in the age of the schools, which was reflected in everything from the way the building was heated to the furniture that was used, the grades (k-8), the instructional spaces, the curricular philosophies (as mandated), the teaching staff (age, experience, and achievement), the student body (socio-economic), and school size (800 children) remained constant. The findings revealed that,

> Students in schools where special attention has been given to the physical environment experienced a greater degree of success in the academic realm of the curriculum as well as attendance, discipline and health (Burkett, 1988).

In another study, Mwamwenda and Mwamwenda (1987) sampled fifty-one primary schools in Botswana, Africa, and compared them on measures of availability of classrooms, availability of desks and seats,

and availability of books. They then tested students' achievement. In all cases, students in schools possessing the essential space and learning materials scored better than students in schools that were deprived. "In summary, the present research supports the argument that school facilities are integral to academic achievement" (Mwamwenda and Mwamwenda, 1987). The study further argues that,

> ...one reason why pupils' performance in science, mathematics and languages in developing countries is inferior to the performances of pupils in the West can be attributed to a lack of adequate provision of school facilities (Mwamwenda and Mwamwenda, 1987).

Hawkins and Overbaugh (1988) conducted a qualitative study in which video was used to record observations in three American schools selected from the rosters of the Recognition Program of the U.S. Department of Education and three Japanese schools. Input was solicited from the teachers, students, administrators, and custodians. Six major areas of interface between the school facility and learning were revealed. The findings suggest that student learning is enhanced when the facility 1) is an integral part of the community, 2) is adaptable to the users' needs, 3) permits teachers to function as professionals, 4) fosters communication, 5) creates appropriate behavioral settings, and 6) accommodates a variety of learning styles. "When the interface between learning and facilities occurs, there can be little doubt the

school building can and will make a difference" (Hawkins & Overbaugh, 1988).

Other studies stop short of saying that the built environment has a positive effect on learning outcomes, saying only that there is an effect. Hathaway (1988a) defines factors in facility design that may aid or inhibit learning. The main categories include 1) perceptual constraining factors, the messages that buildings transmit about themselves that are undetectable by the five senses (e.g., accessibility, spatial attributes, aesthetics, etc.); 2) individual constraining factors, those physical, social, physiological, and idiosyncratic factor that deal with any individual user and are perceived by the five senses (e.g., light, noise, air quality, etc.); and 3) program constraining factors, the way the building interacts with a given program and its delivery (e.g., support of technology, flexibility of spaces, communication, etc.).

In a separate article on the same topic, Hathaway (1988b) states,

> While too little is known about the causal relationships, common sense may be used to avoid building facilities that unduly constrain or inhibit programs or human performance. Research and careful attention may even identify ways in which facilities can contribute to the enhanced performance of occupants.

Earthman (1985) offers opposition to the studies that reveal a correlation between the environment and learning. He does not suggest that there is no correlation, but rather that this effect has not yet been properly demonstrated. "In spite of all the research that has been

done..., it is impossible to identify any sort of a relationship between achievement and the physical environment." The difficulty lies in the inability to control for all the variables that could potentially affect the learning outcomes.

While these studies may not provide definitive proof that there is a correlation between the built environment and learning outcomes, what can be inferred from the research efforts is the perception that the built environment may or may not effect learning outcomes. Underlying this perception is the belief that if a correlation was found between the built environment and learning outcomes, then the role of architecture in education would be to increase learning outcomes through good design.

Summary

Both the architectural and the educational literature suggest that architecture has a role to play in education. This seems consistent with the widely and long-held belief that there is a link between the schoolhouse and the education occurring within it. "More than 150 years ago reformers and educators in the United States began to claim that the schoolhouse was fundamental to the education of the young" (Cutler, 1989). The literature, however, differs on exactly what architecture's role is to be. The architectural literature seems to suggest

that the architecture can best serve education by providing an aesthetically pleasing environment in which to learn. The educational literature seems to suggest that it is more important that the architecture respond in some way to the educational program, though there seems to be no consensus as to which way would be most appropriate. Research to determine if a correlation exists between the built environment and learning outcomes is inconclusive. At best, it can be said that the built environment has some effect on learning.

CHAPTER THREE

Methodology

Conceptual Framework

This dissertation was framed within the naturalistic paradigm and employed the use of computer-assisted qualitative data analysis software.

Naturalistic Paradigm

Research framed within the positivistic paradigm is characterized by its strict reliance on empirical data (Lincoln and Guba, 1985). This reliance necessarily limits the potential of research in which it is difficult or impossible to operationally define the object under investigation. "This difficulty...arises from the intrinsic nature of the subject matter, that is, from the organism's real compositional nature and structure and the causal texture of its environment" (Meehl, 1978). Such is the difficulty inherent in understanding perceptions about the role of architecture in education. While it may be possible to measure the frequency with which new schoolhouses are being constructed, compare building expenditures over the last five years, rate the educational value

of architecture along an interval scale, or otherwise quantify what is perceived to be significant, to do so would deny the context from which the data came, stripping them of their essence and rendering subsequent analysis meaningless. To study data in their original context and gain a better understanding of the multiple realities that underlie their meanings, it will be necessary to adopt an alternative paradigm in which to frame this research.

The naturalistic paradigm offers such an alternative. By recognizing the validity of a human researcher as instrument, "because it would be virtually impossible to devise a priori a nonhuman instrument with sufficient adaptability to encompass and adjust to the variety of realities that will be encountered" (Lincoln and Guba 1985); by acknowledging the value of context specific data, "because naturalistic ontology suggests that realities are wholes that cannot be understood in isolation from their contexts" (Lincoln and Guba 1985); by employing qualitative research methods, "because they are more adaptable to dealing with multiple...realities" (Lincoln and Guba 1985); by utilizing purposeful sampling, "because [this] increases the scope or range of data exposed...as well as the likelihood that the full array of multiple realities will be uncovered" (Lincoln and Guba 1985); by enlisting induction in the analysis of data, "because that process is more likely to identify the multiple realities found in those data" (Lincoln and Guba 1985); and by

striving for idiographic interpretations of the analysis, "because interpretations depend so heavily for their validity on local particulars, including the particular investigator-respondent...interaction, the contextual factors involved, the local mutually shaping factors influencing one another, and the local (as well as investigator) values" (Lincoln and Guba 1985), the naturalistic paradigm and its relevant substantive theories provide a better degree of fit for this research than the positivistic paradigm.

Computer-Assisted Qualitative Data Analysis

While the naturalistic paradigm provides answers to many methodological concerns, it gives rise to others. Immersed in a wealth of qualitative data, the naturalistic researcher can no longer rely on an analysis of variance to give meaning to quantified variables and must, therefore, look elsewhere to assure that the research process is valid and reliably informed. Qualitative research methods (e.g., transcribing data into a more usable format, making sense of material by segmenting information into chunks, arranging chunks into meaningful groups, writing memos to record thoughts, maintaining a process log to monitor the research design, etc.) provide the necessary foundation to proceed with assurance, but the challenge facing the qualitative researcher remains daunting.

Computers can make this challenge more manageable by providing an efficient and accountable means for collecting, organizing, and analyzing qualitative data. Reneta Tesch, a pioneer in the field of computer assisted qualitative data analysis, states in Weitzman and Miles (1995),

> ...computer-aided analysis can reduce analysis time, cut out much drudgery, make procedures more systematic and explicit, insure completeness and refinement, and permit flexibility and revision in analysis procedures.

By freeing time and energy otherwise dedicated to the laborious chores of managing and manipulating huge quantities of data, computers can allow the research to progress to a deeper level of sophistication.

The applicability of computer-assisted qualitative data analysis software (CAQDAS) to the naturalistic paradigm cannot, however, be taken for granted. Before justifying their use, the research framework and its substantive theories must be taken into consideration. In regards to grounded theory and emergent design, there are several issues to consider. First, because generating a theory necessarily involves a process of research (Glaser and Strauss, 1967), it is important that this process be allowed to occur without distraction. A computer application, therefore, should be easy to learn, intuitive, and well matched to the research framework, permitting the researcher to stay focused on the research process without having to divert attention to managing the CAQDAS. Second, because grounded theory is generated by, and emerges

from, close contact and direct involvement in the empirical world (Patton, 1990), it is necessary that the researcher remain as close as possible to the data. A computer application, therefore, should allow a researcher to be immersed in, rather than distanced from, the data being analyzed. Third, because the research process diverges as theories emerge (Lincoln and Guba, 1985), it is essential that a record of the process be kept to trace development, provide accountability, and justify findings. A computer application, therefore, should maintain an audit trail, provide a means by which to record ideas, and allow recorded ideas to be connected to the data about which they were written.

Two computer applications, Folio VIEWS and MetaDesign, were used in this study because of their applicability to naturalistic inquiry and the researcher's preference to analyze ideas graphically. More specifically, Folio VIEWS, a code-and-retrieve program, provided 1) features to segment data by way of one step, contextual, free-form coding closely resembling the highlighting of text on hard copy; 2) powerful search engines that extended the possibilities of retrieval, helped ensure recovery of relevant information, and provided the potential for comparisons that might not have otherwise been attempted; 3) the capacity to annotate text and write memos about the data; and the ability to connect ideas to one another through hypertext links (Folio Corporation, 1993). MetaDesign, a conceptual network-builder, provided

a means by which to graphically represent ideas and their relationships to one another using "nodes" and "connectors" (Laverty and Albright, 1993). In addition, both programs are well designed, intuitive, and easy to learn.

Because the introduction of CAQDAS into the naturalistic paradigm is relatively new, their potential for research and analysis is largely undocumented. In this study the computer was expected to assist as described above, but, in keeping with the theme of an emergent design, was also expected to assist in ways heretofore unknown.

Data Collection

"Grounded theory" and "emergent design" are substantive theories of the naturalistic paradigm affecting how samples are chosen and data is collected. In contrast to the positivistic paradigm in which theory is established a priori, a grounded theory is one that emerges from the data as the research progresses. Because "no a priori theory could anticipate the many realities that the inquirer will inevitably encounter in the field, nor encompass the many factors that make a difference at the micro (local) level" and because "...the existence of multiple realities constrains the development of a design based on only one (the investigator's)

construction," Lincoln and Guba (1985) argue that the research design must be permitted to emerge.

This research followed an emergent design, but established parameters guided its implementation and helped to ensure that its purpose was achieved. These parameters are outlined in the following sections.

Sample

Informants were chosen purposefully to develop an information-rich sample that fostered in-depth analysis. A combination of extreme and opportunistic sampling was used to select educators, architects, and consultants dedicated to schoolhouse design. "The logic of extreme case sampling is that lessons may be learned about unusual conditions or extreme outcomes relevant to improving more typical programs" (Patton, 1990). The initial sample was comprised of 1) local architects who indicated on a list provided by the American Institute of Architects that sixty percent or more of their billings from last year were in educational design, 2) local educators who were familiar with issues surrounding schoolhouse design because their jobs required them to be, and 3) nationally known educators, architects, and consultants whose reoccurrence in or contributions to the literature on schoolhouse design demonstrated their influence.

Informants were contacted by telephone or by mail to secure their participation in the study. A copy of the initial letter of contact can be found in Appendix A.

Informants. Informants are listed below.

Ben Motley – Mr. Motley is president of Motley + Associates, an architectural firm in Roanoke, Virginia. His firm indicated that ninety percent of their work last year focused on educational design.

Henry Hiner – Mr. Hiner is a partner in Bond Westmoreland Comet + Hiner, an architectural firm in Richmond, Virginia. His firm indicated that eighty-three percent of their work last year focused on educational design.

Al Reaser – Mr. Reaser is Director of Building Services for Albemarle County, Virginia. He is currently involved in the process of designing a new high school for the county.

Hunter Barnes – Mr. Barnes is the architectural consultant for Facility Services for the State Department of Education in Richmond, Virginia. He has been involved in writing many of the Commonwealth of Virginia's guidelines for school building design.

Basil Castaldi – Dr. Castaldi is an educational consultant working in South Dartmouth, Massachusetts. His book, Educational Facilities: Planning, Modernization, and Management, has been adopted by over

one hundred colleges and universities as the textbook for their courses on school plant.

Sara Crumpacker – Dr. Crumpacker is an educational consultant working in Northern Virginia. She has been active in attending conferences on educational architecture and has written several articles on "school as place."

Ben Graves – Mr. Graves is president of Educational Planning Consultants, an educational consulting firm in Austin, Texas. He was a founding member of the Educational Facilities Laboratory in the '60's and is widely published in the educational literature.

Bruce Jilk – Mr. Jilk is an architect with the firm of Hammel Green & Abrahamson in Minneapolis, Minnesota. He was involved in the New Designs for a Comprehensive High School project sponsored by the National Center for Research in Vocational Education, University of California-Berkeley, and has applied that research to the designs for the new Albemarle County high school.

Henry Sanoff – Mr. Sanoff is a professor of architecture at North Carolina State University's School of Design in Raleigh, North Carolina. He has been actively involved in exploring the relationship between the built environment and education for over thirty years and has written several books, the latest being Creating Environments for Young Children.

According to Patton (1990), sampling to the point of redundancy is ideal, but where practical limitations prohibit doing so, he recommends "specify[ing] *minimum samples* based on expected reasonable coverage of the phenomenon given the purpose of the study and its stakeholders." Given the purpose of this research, a sample of nine informants provided sufficient coverage of the topic with the understanding that "[the researcher] may change the sample if information emerges that indicates the value of change" (Patton, 1990).

The initial sample expanded to include additional informants who were recommended during data collection, increasing the sample size to eleven. "Being open to wherever the data lead...permits the sample to emerge during fieldwork" (Patton, 1985). Two informants who emerged from the data are listed below.

Bob Moje – Mr. Moje is a principal partner in VMDO Architects in Charlottesville, Virginia. His firm indicated that eighty percent of their work last year focused on educational design.

Anne Taylor – Dr. Taylor is director of the Institute for Environmental Education at the University of New Mexico. She has developed a formal curriculum, *Architecture and Children*, which links learning objectives with the built and natural environment.

Statement of Informed Consent. While most agreements between a researcher and an informant are tacit, Miles and Huberman

(1994) stress the need to reach an explicit agreement about shared expectations. Informants who agreed to participate in this research were sent a letter of confirmation to which was attached a formal Statement of Informed Consent explaining the purpose of the research and outlining the researcher's and informants' responsibilities. The Letter of Confirmation and the Statement of Informed Consent are provided in Appendix A.

Because the information gathered was not sensitive and because the names and positions of those interviewed lent credibility to the research findings, no attempt was made to conceal the identities of interviewees. Interviewees were given the opportunity to indicate their preference to remain anonymous on the Statement of Informed Consent, but none did so. Signatures by both parties on the informed consent statement indicate that a mutual agreement between the researcher and the informant was reached. The Statements of Informed Consent are available from the researcher upon request.

Data

The belief that "...the perspective of others is meaningful, knowable, and able to be made explicit" (Patton, 1990) is fundamental to the naturalistic paradigm. Accordingly, the informants' perceptions about architecture's role in education were made explicit through

conversations with them. These conversations were conducted within the framework of formal interviews.

Interviews centered around a single main question, "How would you, the informant, describe the role of architecture in education?" Informants were notified of this question in advance through the Letter of Confirmation (See Appendix A) so that they would have the opportunity to reflect on it before responding. The question was intentionally broad to provide the informants the freedom to respond from their own perspective without having to conform to expectations about what that perspective might be or where it might lead the conversation. Probing questions about their perceptions on architecture's current status, future direction, and potential as a partner in the educational process were asked to "...clarify and complete the answers..." (Rubin and Rubin, 1995) and to help ensure that the research topic was sufficiently covered. Follow-up requests for more depth or specific examples were generated from the emergent conversations, and the informants were asked to pursue themes, elaborate on the context of the answers, and/or explore the implications of what was said (Rubin and Rubin, 1995). Appendix B provides a copy of the interview protocol used.

With the informants' consent, interviews were tape recorded, transcribed, and imported into a Folio VIEWS "infobase" (i.e, database).

Each informant was mailed a copy of their transcript with an accompanying Request for Member Checking asking them to verify the accuracy of the transcript and/or make revisions. Appendix B provides a copy of the Request for Member Checking. Corrections to the infobase were made based on their revisions, and the corrected transcripts served as the primary medium for analyzing the data gathered from interviews.

Data Analysis

As is the practice within the naturalistic paradigm, no a priori theory was imposed on the analysis. Instead, data was "made sense of" and theory was developed as a process of emergent design.

Coding and Categorizing

Coding, i.e., "assigning units of meaning to the descriptive or inferential information compiled during a study" (Miles and Huberman, 1994), and categorizing, i.e., "bringing together of codes related to one another in content for the purpose of discerning recognizable patterns" (Miles and Huberman, 1994), facilitated the emergence of theory from the data. Folio VIEWS facilitated the assignment of electronic codes to meaningful chunks of data within the infobase. Appendix C provides a list of the codes and their meanings.

An initial coding pass applied codes to data that provided information about 1) the informant's influence in the field, 2) the informant's general perceptions about the role of architecture in education, 3) their perceptions about the way architecture *is* being used in education (if different from their perceptions about how it *should* be used), and 4) their perceptions about how the role of architecture may change in the future. The tape recorder played back each conversation as the codes were applied to help ensure that meanings communicated through voice inflection, pauses, and/or utterances were not lost.

The electronic search engines in Folio VIEWS were used to search for and display categories. Categories were examined to determine patterns, identify inconsistencies, note descriptive examples, and register poignant quotes found within them. From this examination, five metaphors for the role of architecture in education based on the perceptions of the informants were developed.

A second coding pass applied codes to information about and examples of the five metaphors. Again, listening to the taped interviews as this was done facilitated the process.

A final coding pass was conducted to search for themes that emerged from first two passes that were indirectly related to perceptions about the role of architecture.

Memoing

Information gleaned from the analysis of codes provided the foundations for developing theory. These foundations were recorded in the infobase as electronic memoranda detailing the researcher's interpretations of the data and their meanings. These memoranda, in turn, served as the foundation for the final analysis, establishing an auditable link between it and the data about which it was written.

Product

The analysis of the data resulted in 1) informant sketches providing information about each informant's background and the influence they have had on schoolhouse design and 2) metaphors describing five perceptions about the role of architecture in education. The metaphors contain thick descriptions of ways in which the informants described architecture's roles from their relative perspectives. Figure 3-1 diagrams the process of naturalistic inquiry that led to this synthesis.

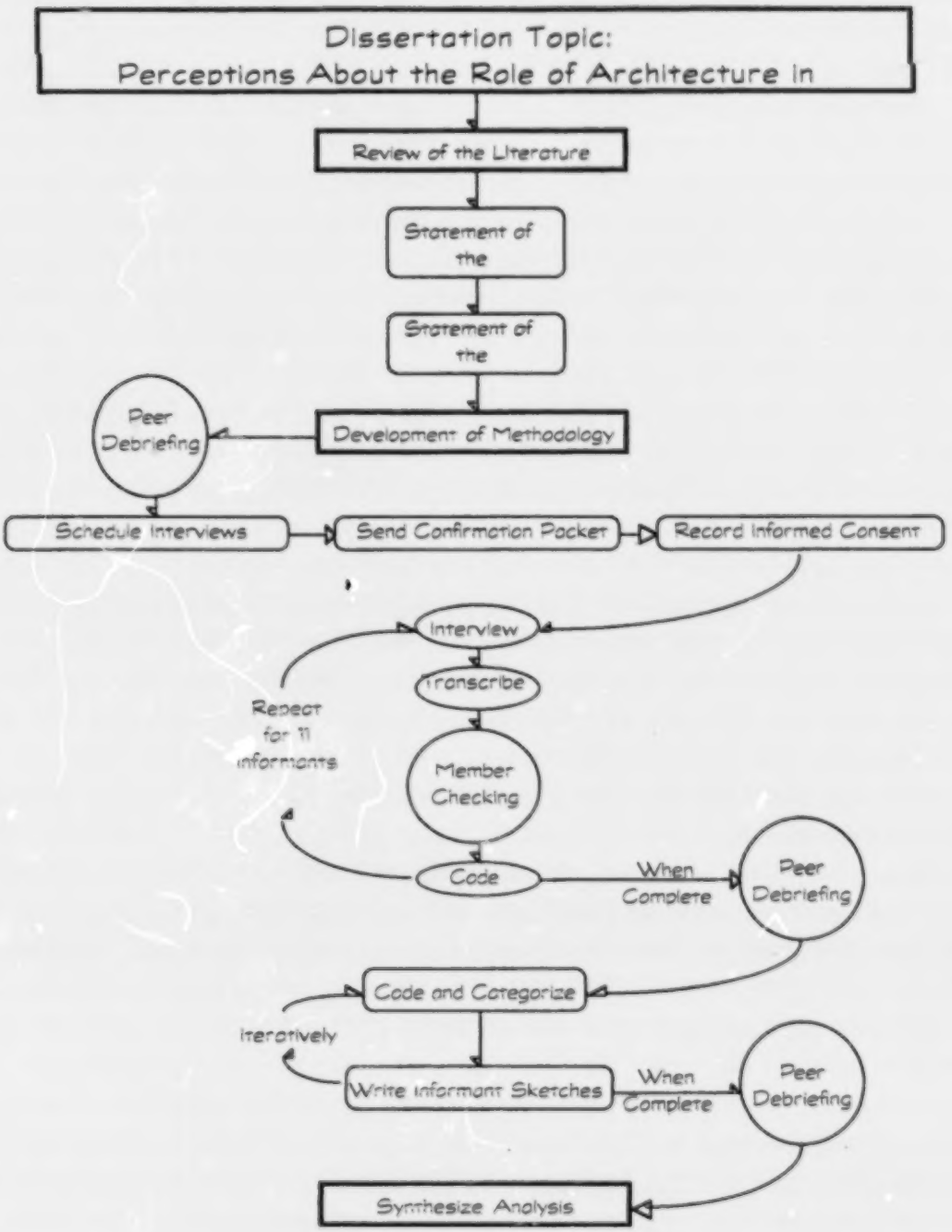

Figure 3-1. Process of Naturalistic Inquiry

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Trustworthiness

Analysis and findings were made trustworthy by establishing the credibility, transferability, dependability, and confirmability of the research.

Credibility

Lincoln and Guba (1985) recommend that the researcher utilize field activities, peer debriefing, and member checking to improve the probability that the findings and interpretations of the research will be credible.

Field activities. Two field activities, "triangulation" and "persistent observation," were performed as a process of data collection and analysis.

Information is better informed, and hence more credible, when it can be verified by more than one source. Accordingly, data was triangulated about the perceptions held by each informant using, primarily, the interviews and, secondarily, their writings about and/or design for schoolhouses. Figure 3-2 illustrates this concept. Also, the varied experiences of the informants provided a broad range of perspectives with which to inform the metaphors.

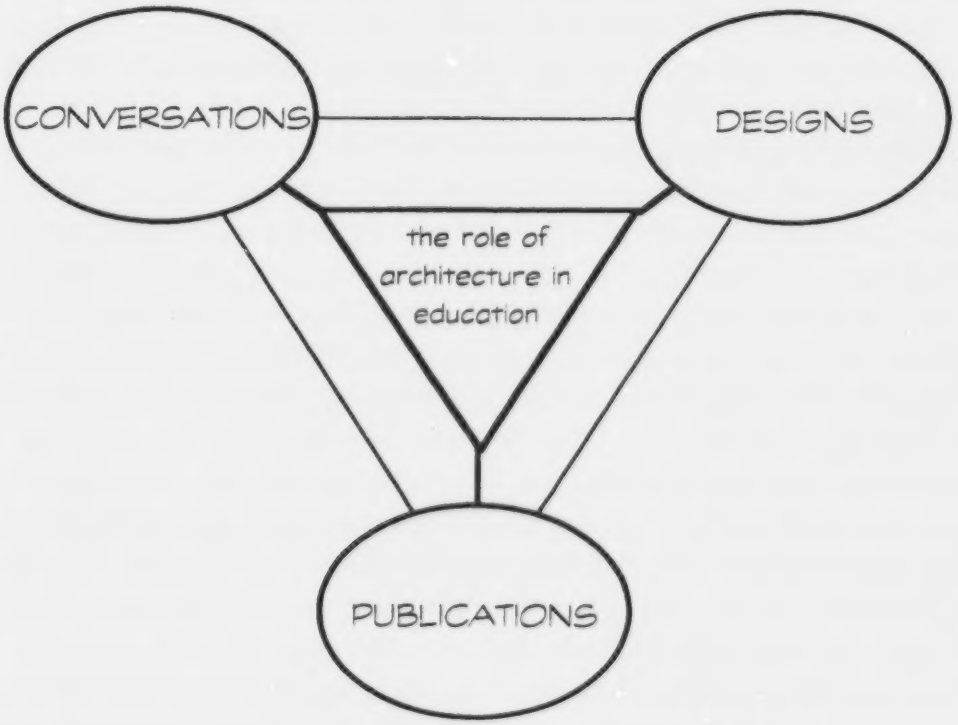

Figure 3-2. Triangulating Sources of Data

Persistent observation was used to focus analysis of the data on "characteristics and elements in the situation that [were] most relevant to the problem" (Lincoln and Guba, 1985). As mentioned previously, an iterative coding process generated codes and categories increasingly more applicable to the question being studied. According to Miles and

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Huberman (1994), codes that emerge progressively in this manner are better grounded in the data and, hence, more credible.

Peer debriefing. According to Lincoln and Guba (1985), peer debriefing exposes the research data, analysis, and findings to a disinterested third party "for the purpose of examining aspects of the inquiry that might otherwise remain only implicit within the inquirer's mind." Maria Fatima Rodrigues, a doctoral candidate in the Curry School of Education, served as the peer debriefer for this dissertation. She met with the researcher periodically, examined the data, and provided feedback to help ensure that the dissertation progressed within the established parameters.

Member checking. Member checking is the process of allowing the informants to verify data, interpretations, and conclusions (Lincoln and Guba, 1985). As mentioned previously, informants were sent copies of their transcribed interviews to verify authenticity, make annotations, and/or add new information reflecting changes that had occurred in their perceptions.

Transferability

Producing generalizable findings is not the primary intention of research conducted within the naturalistic paradigm. Because it was

hoped that others will find this dissertation useful, the degree to which the research is justifiably relevant was an important issue.

According to Lincoln and Guba (1985), it is not possible, or necessarily desirable, for the naturalist to specify external validity in the same sense that a positivist can. Instead, "thick descriptions" of cases, informants, or the phenomenon under study are provided for others to determine for themselves the degree to which the research is applicable (lincoln and Guba, 1985). Thick descriptions about ways in which architecture is playing a role in education will provide interested educators and architects with the means by which to compare their perceptions with those of the informants to determine the relevancy of this research to their respective situations.

Dependability and Confirmability

Dependability addresses the positivistic notion of reliability. Confirmability is akin to the positivistic notion of objectivity. According to Lincoln and Guba (1985), "...a single audit, properly managed, can be used to determine [both] dependability and confirmability." An audit involves an independent party examining the process by which the research was conducted and the resulting product. In examining the former, the auditor determines whether the *process* is justifiably applicable to the research for which it is being used and the degree to

which it was applied consistently. In examining the latter, the auditor determines the degree to which the findings, or the *product* of the research, could be said to have reasonably come from the data. Pam Martin, a doctoral candidate in the Curry School of Education, performed auditing duties. An audit trail is available on request from the researcher.

CHAPTER FOUR

Analysis of the Data

Informant Sketches

Understandings about the role of architecture in education are based on the perceptions of people who influence schoolhouse design. In order to provide a context in which to ground these perceptions, "informant sketches" were written for each person interviewed. These sketches provide background information regarding an informant's occupation; education; related professional experiences; publications, presentations, and/or designs; professional affiliations and/or certifications; and/or awards and citations. The sketches also provide information about an informant's area of expertise, describing what he/she does and/or listing contributions that he/she has made to the field.

Informants influencing design regionally and/or nationally were interviewed. The five informants from Central Virginia are listed first. At the beginning of each informant sketch is a scanned copy of the informant's handwritten response to question number eight on the Request for Informant Information. (See Appendix A).

Hunter Barnes

> If, generally speaking, churches are designed to inspire, factories are designed to produce, and shopping malls are designed to sell, then schoolhouses *should be* designed to facilitate (foster) learning.

Figure 4-1. Response by Hunter Barnes

Hunter Barnes is the Architectural Consultant for the Commonwealth of Virginia's Department of Education's Department of Facilities Services located in Richmond, Virginia. Mr. Barnes received his Bachelor of Architecture from Virginia Polytechnic Institute & State University and is licensed by the Commonwealth of Virginia to practice architecture. Before assuming his current position in 1986, he practiced in the private sector with Warren Vaughan Architects and Mosley Henning, Inc. (now the Mosley McClintock Group), two Richmond, Virginia-based architectural firms.

Mr. Barnes has been involved in the planning of schools for over ten years. As Architectural Consultant, his many responsibilities include reviewing designs submitted by districts for construction, preparing facility assessments to determine need, and calculating and tracking construction costs for new schools and renovations across the

state. Mr. Barnes has recently been involved in revising the "Blue Pages," the Commonwealth of Virginia's forty-year-old *School Building Regulations*. The new *Regulations for Public School Building Construction* are currently in draft form and, if approved by the General Assembly, will become the standard to which Virginia's school administrators and architects will refer for guidance when developing the educational specifications and building programs for new schools and renovations.

Henry Hiner

If, generally speaking, churches are designed to inspire, factories are designed to produce, and shopping malls are designed to sell, then schoolhouses should be designed to facilitate attainment of knowledge.

Figure 4-2. Response by Henry Hiner

Henry Hiner is a principal partner in Bond Westmoreland Comet + Hiner, a Richmond, Virginia-based architectural firm. Mr. Hiner received his Bachelor of Arts in Architecture from Ohio State University and is licensed by the Commonwealth of Virginia to practice architecture. Before merging with his current firm in 1992, he was founder of and principal partner in the architectural firm of MacIlroy Needham & Hiner in Richmond, Virginia. Mr. Hiner is a member of the American Institute of Architects.

Mr. Hiner has been involved in the design of educational facilities for over twenty-five years. In the '70's, his firm helped spread the middle school concept still being used to organize grades six through eight in many schools across Virginia. "I enjoy school work, been involved with it for years. Much of it I would call 'leading edge' design." Currently, the focus of his work is designing elementary, middle, and high schools in central Virginia.

Bond Comet Westmoreland + Hiner indicated on the American Institute of Architects' *Directory of U.S. Architectural Design Firms, 1995* that eighty-three percent of its work was focused on education facility projects. The firm's designs for schools have won several awards from the Virginia School Board Association and are published in the architectural literature.

Bob Moje

If, generally speaking, churches are designed to inspire, factories are designed to produce, and shopping malls are designed to sell, then schoolhouses *should be* designed to EDUCATE. (IN THE BROADEST POSSIBLE TERMS).

Figure 4-3. Response by Bob Moje

Bob Moje is a principal partner with VMDO Architects, P.C., a Charlottesville, Virginia-based architectural firm. Mr. Moje received his Bachelor of Arts in Architecture and Master of Architecture from the University of Virginia and is licensed by the Commonwealth of Virginia to practice architecture. Mr. Moje has been with VMDO Architects since founding the firm in 1976. He is a member of the American Institute of Architects.

Mr. Moje has been involved in school design for over twenty years. While at the University of Virginia, he was heavily influenced by Thomas Jefferson's Academical Village. "[Jefferson's Lawn], as a piece of educational architecture reflecting the educational curriculum that Jefferson desired for his university, is, I think, probably the most powerful architectural example in history." Accordingly, Mr. Moje attempts to embody the spirit of the Lawn in his designs for K-12

schools, directly reflecting curricular goals through the learning environments that house them.

Mr. Moje estimates that eighty percent of VMDO Architects' work has been focused on education facility projects. The firm's designs for schools have won several awards from the Virginia School Board Association, the Virginia Society/American Institute of Architects, and the James River Chapter/American Institute of Architects and are published in the architectural literature.

Ben Motley

If, generally speaking, churches are designed to inspire, factories are designed to produce, and shopping malls are designed to sell, then schoolhouses *should be* designed to ENHANCE THE LEARNING PROCESS + EXPERIENCE

Figure 4-4. Response by Ben Motley

Ben Motley is president of and Principal in Charge of Educational Projects for Motley + Associates, a Roanoke, Virginia-based architectural firm. Mr. Motley received his Bachelor of Architecture from Virginia Polytechnic Institute & State University and is licensed by the Commonwealth of Virginia to practice architecture. Mr. Motley has been in his current position since graduating in 1985. He is a member of the American Institute of Architects.

Mr. Motley has been involved in the design of educational facilities for over ten years. The focus of his work most recently has been developing a prototype elementary and middle school that can be site adapted and constructed in localities throughout Virginia.

> We call it a "prototype," but a better term might be a "component" school. The word "prototype" can be deceiving because we usually add or subtract certain components [from the basic design]. [The two designs were] developed with the intent of being site adaptable, flexible, and well fit to elementary [and middle] school programs.

Motley + Associates indicated on the American Institute of Architects' *Directory of U.S. Architectural Design Firms, 1995* that sixty-five percent of its work has been focused on education facility projects. The firm's designs for schools have won several awards from the Virginia School Board Association and the Virginia Society/American Institute of Architects and are published in the architectural literature.

Al Reaser

> If, generally speaking, churches are designed to inspire, factories are designed to produce, and shopping malls are designed to sell, then schoolhouses *should be* designed to enhance learning.

Figure 4-5. Response by Al Reaser

Al Reaser is the Director of Building Service for Albemarle County Public Schools, Albemarle County, Virginia. Mr. Reaser received his Bachelor of Science in Industrial Arts from Salem College and his Master of Education in Counselor Education from the Curry School of Education at the University of Virginia. He is certified by the Commonwealth of Virginia as a secondary school administrator. Mr. Reaser has worked for Albemarle County Public schools for twenty-seven years. Before assuming his current position in 1988, he worked as an industrial arts teacher, a vocational counselor, and a high school assistant principal.

As Director of Building Services, Mr. Reaser's responsibilities include overseeing and maintaining 1.7 million square feet of facilities and five hundred and fifty acres of grounds spread across seven hundred and forty square miles of the county. He is also responsible for overseeing the planning of new schools and renovations, of which there

have been five new schools and twelve major additions/renovations during his tenure. Mr. Reaser is presently involved in the planning, budgeting, and preparation for the new Albemarle County high school. As Director of Building Service for Albemarle County, Mr. Reaser finds himself in a unique position. "I am very fortunate. This community has the wisdom to support its facilities and understands their importance."

Sara Crumpacker

If, generally speaking, churches are designed to inspire, factories are designed to produce, and shopping malls are designed to sell, then schoolhouses *should be* designed to enhance living & learning.

Figure 4-6. Response by Sara Crumpacker

Sara Crumpacker is a freelance educational/organizational consultant in Northern Virginia where she is employed as a Customer Service Consultant for the Federal Emergency Management Agency (FEMA). Dr. Crumpacker received a dual Bachelor of Arts in Elementary Education and Special Education and a Master of Arts in Counseling and Guidance from Michigan State University and a Doctor of Philosophy in Educational Studies from the Curry School of Education at the University of Virginia. Her doctoral dissertation, The Experience of School As Place, was an ethnographic study of Schuyler Elementary School, Nelson County, Virginia, and the effect the physical environment had on the cultural environment of that school. In addition to her full time duties at FEMA, Dr. Crumpacker's continues to publish and maintain an active presence at conferences. Most recently, she contributed an essay entitled, "Using Cultural Information to Create Schools That Work," to the edited collection, Designing Places for

Learning. Before assuming her current position in 1994, Dr. Crumpacker taught public school for a number of years in several places, including the Canal Zone, Panama; San Francisco, California; and Arlington, Virginia; was a corporate trainer in Florida; and worked as an organizational consultant for Akin and Company in Charlottesville, Virginia.

As an educational/organizational consultant, Dr. Crumpacker works with school administrators and architects who are building new schools to ensure that the cultural components of the built environment are not overlooked in the frenzy of state mandates, building codes, budget cuts, etc. As a researcher in schools, Dr. Crumpacker records how a school's occupants react to the building (e.g., how they organize their daily living within and as a result of the environment, how they invent ways to make their surroundings work for them, what perspectives they have about it, what multiple realities exist within the learning community as a result of the environment, what their shared stock of knowledge is about and resulting from the environment, etc.) and listens to their stories about the schoolhouse to understand how they perceive their physical environment and discover what common assumptions they hold. "Actually, I discover the unspoken, common sense information users carry with them, and then make it explicit and obvious – ready for facility planners to use in their work" (Crumpacker in Meek, 1995).

Basil Castaldi

If, generally speaking, churches are designed to inspire, factories are designed to produce, and shopping malls are designed to sell, then schoolhouses *should be* designed to FACILITATE THE EDUCATIONAL PROCESS.

Figure 4-7. Response by Basil Castaldi

Basil Castaldi is an educational consultant working out of his home/office in South Dartmouth, Massachusetts. Dr. Castaldi received a Bachelor of Arts and Master of Arts in Physics from Clark University and a Doctor of Education specializing in Educational Administration from Teachers' College at Columbia University. His experiences include teaching high school physics; working as an educational consultant for the Massachusetts Department of Education's School Building Assistance Bureau; teaching facility planning as a professor in the Department of Educational Administration at the University of Illinois; and serving as Dean of Bristol Community College in Fall River, Massachusetts. He is widely published in the educational literature. His book, Educational Facilities: Planning, Modernization, and Management, now in its fourth edition, has been adopted by 117 colleges and universities, including the University of Virginia, as the textbook for

their facility planning courses. Dr. Castaldi is a member of the Council of Educational Facility Planners, International.

Dr. Castaldi has been involved in the planning of educational facilities for over thirty-five years. In 1955 he developed the Castaldi Nomogram, a method for determining the number of instructional areas per subject required in a school building given the projected class enrollment for each subject, desired class size, and number of school periods in a week. His method became widely accepted as the standard used by school administrators and architects across the country during the '60's and 70's.

As an educational consultant, Dr. Castaldi conducts comprehensive demographic studies for school districts to determine facility needs and develops their long range plans. Dr. Castaldi also develops educational specifications for new schools and renovations and serves as a liaison between educators and architects to help ensure that the educational requirements are reflected in the design.

> What the consultant does is begin to translate what it is that the schools need. He envisions it and puts it in terms of the "educational specifications." And so, the educator, the architect, and the consultant begin looking at it together and eventually you are going to get a very, very functional educational facility.

Ben Graves

Mr. Graves did not provide a written response to question 8.

Figure 4-8. Response by Ben Graves

Ben Graves is president of Educational Planning Consultants (EPC), an educational consulting firm in Austin, Texas. Mr. Graves received his Bachelor of Arts in Liberal Arts from Indiana University. Prior to founding EPC in 1989, Mr. Graves' experiences included working for Perkins & Will, Architects/Engineers and K/M Associates, Inc., two Chicago, Illinois-based architectural firms, and serving as vice president of the Academy for Educational Development and director of their Educational Facilities Laboratory Division. Mr. Graves is widely published in the educational and architectural literature and has a regular column in *American School and University* magazine. He is a member and past president of the Council of Educational Facility Planners, International. His many awards and recognitions include three distinguished service awards from the Council of Educational Facility Planners, International and an Honorary membership from the American Institute of Architects.

Mr. Graves has been involved with the study and planning of schools for over thirty years. As a member of the Educational Facilities Laboratory in the '60's and '70's, he conducted research on and developed plans for the open school movement. He currently provides services through EPC for school administrators and architects across the country. These services include distributing research, conducting facility inventories, developing educational specifications, creating long range plans, and facilitating planning workshops. Mr. Graves works in all of these capacities to help school districts recognize their needs, consider possibilities, and frame the resulting program within the realities presented by a budget.

> I think that probably today planning has become more and more important – much more than it was twenty-five years ago – because we have this mobility of population. Because of my background, though I am not an architect, I can call attention to those things that I think need architectural/engineering evaluation.

Bruce Jilk

If, generally speaking, churches are designed to inspire, factories are designed to produce, and shopping malls are designed to sell, then schoolhouses *should be* designed to DECENTRALIZED INTO THE COMMUNITY TO CREATE SOCIETAL LEARNING/RESOURCE CENTERS.

Figure 4-9. Response by Bruce Jilk

Bruce Jilk is vice president of Hammel Green and Abrahamson, Inc. (HGA), a Minneapolis, Minnesota-based architectural firm. Mr. Jilk received his Bachelor of Architecture from the University of Minnesota and pursued postgraduate studies at the University of Wisconsin. He is licensed by the National Certification for Architects Review Board to practice architecture. In addition to his work at HGA, Mr. Jilk has been actively involved in research initiatives including, most recently, New Designs for the Comprehensive High School and New Designs for the Post Secondary Two Year Institutions, both sponsored by the United States Department of Education. An active speaker and publisher, Mr. Jilk is a member of the American Institute of Architects and the Council of Educational Facility Planners, International.

Mr. Jilk has been involved in designing learning environments for over twenty-five years. During that time his interests have grown to include the examination of the educational philosophies on which the

design of learning environments are based to determine ways in which learning can be made more meaningful.

> My work over the years has developed more into that of an educational planner. Rather than directly designing schools, I lead teams of educators and architects to conceptualize new and effective learning environments.

Through the New Designs initiative, Mr. Jilk helped develop a "design down" process for designing schools that links the learning environment to a school's "learning signature" and its intended learning outcomes. Mr. Jilk has introduced school districts across the country to this process, including Albemarle County Public Schools in Albemarle County, Virginia. This past summer he led the Learning Specifications Development Team that created the vision statement for the new Albemarle County high school. These efforts are expanding geometrically to several foreign countries.

Henry Sanoff

If, generally speaking, churches are designed to inspire, factories are designed to produce, and shopping malls are designed to sell, then schoolhouses *should be* designed to ENLIVEN.

Figure 4-10. Response by Henry Sanoff

Henry Sanoff is a professor in the School of Design at North Carolina State University in Raleigh, North Carolina. Mr. Sanoff received his Bachelor and Master of Architecture from Pratt University and is licensed by the states of New York and California to practice architecture. Prior to assuming his current position in 1966, Mr. Sanoff worked for Peter Blake, Edward Stone, Peter Hopf, and Harrison and Abramovitz, four New York City-based architectural firms, and taught in the Department of Architecture at the University of California at Berkeley. Mr. Sanoff is an international lecturer, is widely published in the architectural literature, and has authored several books, the most recent being Creating Environments for Young Children. He is a member of the American Institute of Architects and is recognized as a founder of the Educational Design Research Association, an organization that brings together architects and social scientists to focus on research dealing with the built environment. His many awards and recognitions include three design awards from *Progressive Architecture* and a Distinguished Fulbright Award.

Mr. Sanoff has been involved for over thirty years with researching and designing learning environments for children. His interests extend to three areas: designing environments for children, sensitizing teachers to the value of the physical environment as a basis for learning, and examining the process by which schoolhouses are designed. In regards to the first area, he has worked as an educational consultant for architectural firms throughout the country and has also authored several books. In regards to the second area, he has lectured at colleges of education; conducted in-service training seminars for teachers; and written several books, including Design Games, a collection of techniques used to sensitize people to environmental design issues. In regards to the third area, he has published several books, including School Design: Planning with People and Integrating Programming Evaluation and Participation in Design, both of which encourage a community-based, interactive design process.

His graduate studios in the School of Design reflect all three areas of interest. "School projects are the majority of the studio activity that the students are having. We are involved with a lot of communities doing training programs and other projects..." that both sensitize the educators to the potential of the built environment and help make the graduate students more aware of the issues surrounding education.

Anne Taylor

Dr. Taylor did not provide a written response to question 8.

Figure 4-11. Response by Anne Taylor

Anne Taylor is Director of the Institute for Environmental Education and a professor in the School of Architecture and Planning at the University of New Mexico. Dr. Taylor received her Doctor of Philosophy from Arizona State University. Her dissertation, entitled "The Effects of Selected Stimuli on the Art Products, Concept Formation and Critical Aesthetic Judgmental Decisions of Four and Five-Year-Old Children," was a quantitative study that determined the effects of a prototype learning environment on 1) aesthetic quality of art products, 2) concept formation of elements of design, and 3) the critical aesthetic judgmental abilities of four- and five-year-olds. Prior to directing the Institute for Educational Education, Dr. Taylor's professional experiences included researching with the Southwest Cooperative Education Laboratory in Albuquerque, New Mexico, and The School Zone Institute, Seattle, Washington, both of which she helped found, and serving as Dean of Graduate Studies at the University of New Mexico.

Dr. Taylor is widely published in the educational literature and has written several books including School Zone: Learning Environments for Children, which stemmed from her dissertation.

As Director of the Institute for Environmental Education, Dr. Taylor works with teachers to sensitize them to the opportunities that the environment presents for learning. She has developed a curriculum entitled *Architecture and Children*, which provides thirteen lesson plans along with suggestions for setting up classrooms. As a professor in the School of Architecture and Planning, Dr. Taylor works with students who in turn work in the community. "I teach a class called 'Architecture and Children' in the School of Architecture. And students take it and they go out into the schools and teach both teachers and students about architecture."

Perceptions About the Role of Architecture

The greatest thing by far is to be a master of metaphor.
– Aristotle

The terms "architecture" and "education" are broad terms that, depending on whom you ask, mean many different things. In this study, architecture was defined by the informants as being the school building, the learning environments within it, the landscaped campus, the infrastructure supporting mechanical systems, the aesthetic details, the instructional equipment, and/or anything created by the users to adapt their environment to their needs. Education was defined by the informants as the formal curriculum; the exchange of knowledge from a teacher to a student; the synthesis and application of acquired knowledge in meaningful ways; the social, interpersonal, and communication skills that result indirectly from membership in an educational community; and/or anything that a student experiences in a school.

When asked to describe the role of architecture in education, almost all of the informants stated directly that architecture's role should be to "enhance" education. Their perceptions about how it should do so, however, were as varied as their definitions of architecture and education. Their responses defined a continuum ranging from

providing shelter to acting as a catalyst for educational reform. Because each informant's perceptions typically encompassed a wide range of thought, no attempt was made to position him/her at any particular point along the continuum. Instead, five metaphors have been developed to collectively describe the informants' perceptions about the role of architecture in education. Each metaphor describes a unique way in which informants perceived that architecture "enhanced" education.

As a Facilitator

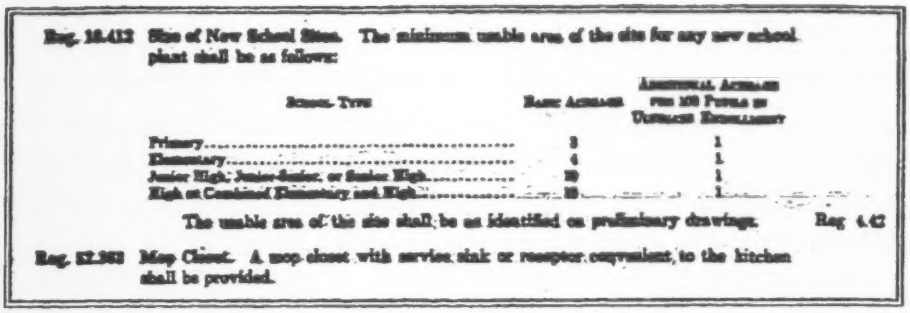
> *Schoolhouses should be designed to enhance – facilitate, maybe the word "facilitate" is a better word – facilitate the learning process. That's what they should be designed for.*
>
> *– Basil Castaldi*

The perception of architecture as a facilitator is one in which the architecture makes possible the activities housed within it. Applied to education, the architecture makes possible the education by, very generally, accommodating enrollment, housing and supporting the curriculum, and controlling environmental factors that might detract from the educational process. According to Basil Castaldi and others who share this perception, a well designed school is "one that's very functional."

While the use of architecture in this capacity may appear so obvious as to require no further explanation, its importance cannot be

overemphasized. If the architecture does not provide basic operational necessities such as the correct number, size, and kind of instructional spaces; the educational equipment to support those spaces; the infrastructure to support the equipment; shelter from the elements; sufficient heating, cooling, and ventilation; adequate lighting; proper acoustics; water and sewage; and handicap accessibility, to name just a few, the educational process can suffer greatly. According to Al Reaser, "There's no doubt that [they have] an affect on it. They can affect instruction quicker than anything else. If the room is too hot or too cold, just from general maintenance, they will affect instruction." Students become uncomfortable and lose focus on the educational experience at hand.

To help ensure that school administrators and architects account for the most essential of the many basic operational needs, the Commonwealth of Virginia has published the "School Building Regulations," a thirty-three page set of guidelines. These Regulations provide recommendations on everything from the minimum size of the school campus (Regulation 10.412) to the proper location of the mop closet (Regulation 52.363). (See Figure 4-12.)



Reg. 10.412 Size of New School Sites. The minimum usable area of the site for any new school plant shall be as follows:

School Type	Basic Acreage	Additional Acreage per 100 Pupils of Projected Enrollment
Primary	3	1
Elementary	4	1
Junior High, Junior-Senior, or Senior High	10	1
High or Combined Elementary and High	10	1

The usable area of the site shall be so identified on preliminary drawings. Reg. 4.42

Reg. 52.363 Map Closet. A map closet with service sink or receptor equivalent to the kitchen shall be provided.

Figure 4-12. Blue Book Regulations 10.412 and 52.363

The School Building Regulations are intentionally broad to increase their applicability. To help tailor them to the specific curriculum and needs of a locality, school administrators and architects often acquire the services of an educational consultant. The educational consultant serves as a liaison between the educator and the architect, translating the school's curriculum, activities, and requirements (lighting, acoustical, environmental, equipment, mechanical support, etc.) into terms the architect can better understand. The architect can then design a working school. According to Castaldi, "...eventually you are going to get a very, very functional educational facility."

Educational consultant Ben Graves feels that current and projected enrollments should be the basis for determining how the architecture can best serve the education. "The key is enrollment figures;" everything stems from the number of students who are expected

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to occupy a building. Regulation 10.412 provides an example of how the appropriate size for the campus is determined by enrollment.

Even more critical is the size of the schoolhouse itself. Basil Castaldi uses a formula to determine the number of classrooms, which in turn helps determine the proper size of the school building. Figure 4-13 shows and provides a key for his formula (Castaldi, 1994).

$$T.S. = 1.25 \frac{(E/C)(n/N)}{}$$

T.S.	=	number of teaching stations required
E	=	number of students enrolled in a course
C	=	the desired class size
n	=	the number of periods per week students attend the class
N	=	the number of periods in the school week

where 1.25 is an adjustment for occupancy percentages

Figure 4-13. Castaldi's Formula

For example, in a school where the desired class size is 21 and the number of periods per week is 40, a subject in which 250 students are enrolled that meets five times a week would require two classrooms (teaching stations). Teaching stations equal 1.25(250/21)(5/40), or 2 (rounded up from 1.86).

A school that is too small will become a distraction to students who are crowded into overpopulated classrooms, stymied by the lack of fresh air supplied by an undersized ventilation system, and frustrated by the limited availability of the overbooked audio/visual equipment. Likewise, a school that is too big will tax fiscal resources as mechanical systems operate to support and custodial staff work to clean spaces that go unused.

The architecture must accommodate the instructional equipment and support it through its infrastructure. According to Ben Motley,

> The architecture should respond functionally, at the very least in terms of the building's infrastructure, and, ideally, in many other ways as well, through items such as plan configuration, acoustics, flexible lighting, etc.

Motley illustrates this point by describing the way in which the architecture makes possible and supports the activities that might be scheduled for an "electronic classroom."

> Instead of a flat floor, it's a stepped floor, almost like an auditorium or a theater, where the seating is curved to focus on either a drop down screen or a lecturer. There's a fixed table [on each of the stepped levels] that is designed so that laptop computers can be placed on it. Cable trays [attached beneath the tabletops] house network connections so that the laptops can be linked into the school.
>
> [The room] is acoustically designed to be quiet, not only for voice, but also to mechanical systems and other noises. This particular room is a "dark room." It doesn't have any natural light. This is necessary because [one needs to] very carefully control for glare.
>
> The building has a huge antenna farm so that satellites and antennas can relay information. It is flexible to allow for the

> addition or removal of satellites and antennas as necessary. Right next to [the electronic classroom] is a "down link room" to bring all of the satellite information into the classroom.

Schools are often used for community use. The advantages of such use include establishing a connection with the surrounding community through shared space and more efficient use of space. There are, however, some disadvantages, which include security problems and wasted energy when mechanical systems run for an entire building when only a small portion is being used. Architecture can help address these and other issues to make possible community use of the school.

According to Castaldi (1994), "The design implications of community use are many and varied. First, architects must zone schools to permit different parts of the building to be used at various times." Ben Motley explains how this is done.

> Things like the gymnasiums, the cafeteria, the library, the instructional media centers are areas of the school that the public, after hours, will have access to. Those [areas] are grouped [within the layout of the school] so that they can be easily accessed after hours. It is fairly easy to separate in a secure fashion to keep the public out of the [other parts] of the school. Also, the mechanical systems are zoned so that you can run them [in certain areas] without having to run all of the classrooms.

The use of architecture to create a schoolhouse that is the best possible *facility* in which to learn is important for all of the reasons given by Reaser, Castaldi, Graves, and Motley. A school must function to

accommodate enrollment, support the curriculum, and eliminate distracting environmental factors.

As a Place

> *The learning environment needs to provide a sense of meaningfulness for the students, a sense of identity, a sense of connectedness.*
> – *Bruce Jilk*

The perception of architecture as a place is one in which the architecture provides a meaningful context, one with which the occupants can identify, for the activities it houses. Applied to education, the architecture creates learning environments in which the student gains a sense of identity, the educational process becomes meaningful, the educational experience becomes exciting, the school is made to seem inviting, shared sensory memories are possible, and the members of the educational community are made to feel secure and at home.

> Through a great deal of discussion, listening, and questioning... an architect and client should be able to [reflect in the design] not only the physical requirements of the building but also some of the less tangible (but no less important) characteristics that will give the school its own personality (Ben Graves, 1993).

According to Crumpacker (in Meek, 1995),

> ...people who spend their days in schools often describe and interpret that experience favorably only when they are afforded personal choices. Therefore, schools should be planned so the users "bump into" different choices on a daily basis – buildings full of variety, where people experience increased personal satisfaction and comfort because they have some say-so over their daily living.

The architecture can contribute to a student's sense of identity by providing choices for which they can be personally responsible. These choices could include a selection of shapes and sizes of desks and chairs, different lighting conditions and temperature zones, a variety of ways to enter into and move throughout the building, etc.

According to Crumpacker, "...there was a need [at Schuyler Elementary] for people to record their existence in the building, to leave behind a record." This record might be misconstrued as vandalism, e.g., writing on the bathroom wall, but Crumpacker, suggesting that the architecture can provide positive outlets for this need, continues, "Why not make it constructive by allowing them to design the tiles in the hall. Each of them could have a tile." Displaying students' art is another constructive way. By allowing students to record their presence within, on, or as a part of the environment, the architecture helps them to connect with it and can be another way of contributing to the students' sense of identity.

The architecture can contribute to a students' sense of identity by providing students with their own personal space within the learning environment. This is done to some degree by prov ıg students with lockers, but Bruce Jilk takes this a step further through his research for Designs for a New Comprehensive High School. "In our high school

designs, instead of providing classrooms, we provide each student with his/her own working station. This has a lot to do with their sense of identity." Figure 4-14 shows how these work stations are arranged in groups of five in "homebases" (Copa and Pease, 1992).

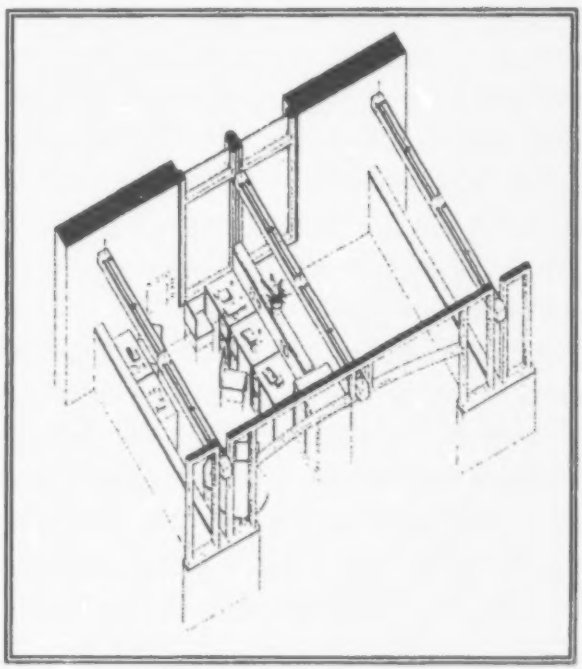

Figure 4-14. Student Workstations in a Homebase

Homebases are organized into "families" comprising "communities" that comprise a school. In addition to providing students with their own places to work and study, breaking down a school into divisible units makes it seem less institutional and more personal "...as opposed to the

traditional high school where students may be one of two thousand students wondering around the corridors where there is anonymity." Jilk continues, "Where this is done is has turned out to be quite successful. The kids have to be shagged out of the building at the end of the day."

Crumpacker suggests that a sensory information conveyed through the architecture can provide familiarity which contributes to students' feelings of comfort.

> Sensory information helps building users interpret their daily living and makes their days predictable.... The sights, sounds, smells, and touches available in a building make it alive for the present and ensure that it will live on as recalled memories later (in Meek, 1995).

Crumpacker described one set of sensory experience derived from the floors in an old school,

> ...the crackle of the wooden floors in the building where I went to elementary school. You could hear someone coming down the halls because the floors would crackle and creak. Or the smell you would get from that floor on Mondays after they had been in on the weekend and used paraffin oil on it.

School buildings with no windows can isolate students and teachers in an artificial world. While it is possible to adapt to these conditions, most occupants would agree that such is an environment is unpleasant. In contrast, a connection with the outdoors can have the opposite effect by helping to establish a more natural context in which to situate learning. "The importance of the outdoors is documented in

almost every school. Being able to see what lies beyond the building's walls lets us know what's going on around us" (in Meek, 1995). The architecture can help make this connection through windows that provide natural light and views to the outside, outdoor walkways that allow students to circulate in fresh air, landscape gardens that allow students to study plants and rocks in their natural state, etc.

Sara Crumpacker found that windows not only provide a connection to the outdoors, they also provide students with a feeling of comfort and security because they could see what was going on around them.

> One of the things we found at Schuyler was that life was predictable because the entire school had windows all the way around it. In any room [besides the Center], you could go in and see outside. You could see that so-and-so's mother's car was outside so you know that so-and-so's mother is [at the school] teaching pottery to the third grade class that day. Or that the milk truck is coming down the side of the building so today is Tuesday and you're going to have those ice cream sandwiches at lunch time today. That is predictability, and I think kids like that.

The introduction of computers into the classroom presents teachers and students with many exciting possibilities. These possibilities could come at the expense of "context;" however, if improperly managed, teachers and students could become so absorbed by the technology that they lose touch with reality. Bob Moje warns of the danger inherent in this.

> The further that we are removed from reality, the further that technology allows us to progress into a virtual world, the more important it will be to provide a real context in which to exist. Architecture provides that context...

...by positioning technology properly within the context of learning and eliminating barriers potentially erected by the computer.

For example, instead of having "computers on every desk," as many people would prefer, the built environment could position computers *in* every desk, thus eliminating the hardware that physically separates the teacher from the students. This also lessens the focus placed on the computer (a computer placed atop a desk often becomes the center of attention) and reverts it back to the relationship between the teacher, the student, and the learning experience.

Providing a pleasant environment in which to teach and learn is also important. Hunter Barnes says that a building should "excite." Henry Hiner says that the school should create "...interest and mood and generally good feelings." Ben Motley says, "Certainly, if a teacher enjoys his/her space, enjoys being [at school], it's going to affect his/her persona, it's going to affect her ability to teach the kids."

Motley illustrates how a new addition to an old school made teachers in that school aware of how much they appreciated the aesthetic qualities made available through the older architecture in spite of itself. He says,

> [the teachers enjoyed] the classical features in the [older part of the school], nice detailing on the cornices, large windows, terrazzo floors, warm brick materials coming inside the classroom, the wainscoting, high ceilings. And even though there was no air conditioning and the heating system didn't work very well, the teachers will actually prefer the older, warmer, more pleasant environment rather than the newer one.

In a word, the older addition had "character."

Architecture can provide students with a sense of identity and a meaningful context in which learning can occur in all of the ways stated by Barnes, Crumpacker, Hiner, Jilk, Moje, and Motley.

As a Signpost

> *There are ways to determine direction other than pointing a sign. Part of that is the size and shape of an opening. Is it large enough? Does it look like the first place you would go because there is a big arch there? Or is it just a little bitty doorway?*
>
> *– Sara Crumpacker*

The perception of architecture as a signpost is one in which the architecture communicates implicitly through design that which signage might otherwise communicate explicitly. Applied to education, the architecture makes apparent the relative importance of spaces within the school, provides a clearly understood pattern of circulation, denotes which activities occur within which environments, and signals which behaviors are appropriate for activities in their respective environments. While signage is universally recognized as the primary medium for

communication, those who hold the perception of architecture as a signpost do not necessarily agree that it should be. First, signs present a difficulty for those who cannot read (e.g., young children, those who do not speak/read English, etc.), resulting in possible confusion and/or low selfworth. Second, an overreliance on signs justifies irresponsible application of architecture, resulting in a repulsion (e.g., strip malls, federal buildings) that serves to desensitize one to his/her environment. Well-designed architecture addresses both of these problems by making the required information intuitively clear.

Entering a building is an important daily ritual in the life of its occupants. Crossing a threshold announces arrival, provides a transition between outside and inside, and prompts the enterer to prepare for his/her purpose in the building. As such, an entrance becomes a critical element within the architectural composition. It should, in the case of a school, signify that a place of importance lies behind its doors, encourage passage for those who belong and discourage passage for those who do not, provide a transition between the environment the student is leaving and the learning environment he/she is about to enter, and signal the student's arrival, cuing him/her to prepare for learning.

The space beyond an entrance, typically a public lobby that doubles as a circulation hub, is equally important. For a person

entering the building for the first time (e.g., a parent or a visitor), it is the first interior space they will encounter, and the impression left by it will affect how they experience the rest of the building. As such, this space should make clear the choices available to and appropriate for the enterer. Wide halls and bright lights welcome passage, whereas small doors closed shut say "no admittance." Open doors leading to a semi-public reception area signal that the enterer is welcome, but the closed door beyond it leading to the principal's office indicates that, depending on the circumstances, the enterer may pass no further.

When a building's entrance and lobby indicate their presence by no means other than a sign; afford no transition between inside and outside, public and private; provide no intuitive clues for the enterer; and/or are generally poorly designed, the enterer can easily become disoriented. Sara Crumpacker describes the feeling unfamiliar visitors have entering a poorly designed environment,

> Oh! The feeling parents have when they go into a building that is halls and pods and modules for the first time. It's not obvious how to get where they are going. They feel stymied. They don't know where to go. They have to ask somebody. This serves to discount people.

This can be particularly true for non-English speaking parents of children in multilingual schools.

In contrast, Sara Crumpacker describes an entrance designed by Bob Moje that she found particularly effective.

> One of the things that Bob tried to do on a renovation of a school here in Arlington was create an entire new entrance which sort of...the school just opened its arms to you. Before, there was this nice old fashioned, columned front door, but nobody ever used it. You parked in this little postage stamp lot and entered through a side door. But, Bob changed the entire entrance. Now, it is as if the school is opening its arms and welcoming the people.

Figure 4-12 shows the entrance to Barrett Elementary Schools in Arlington, Virginia (VMDO, 1996).

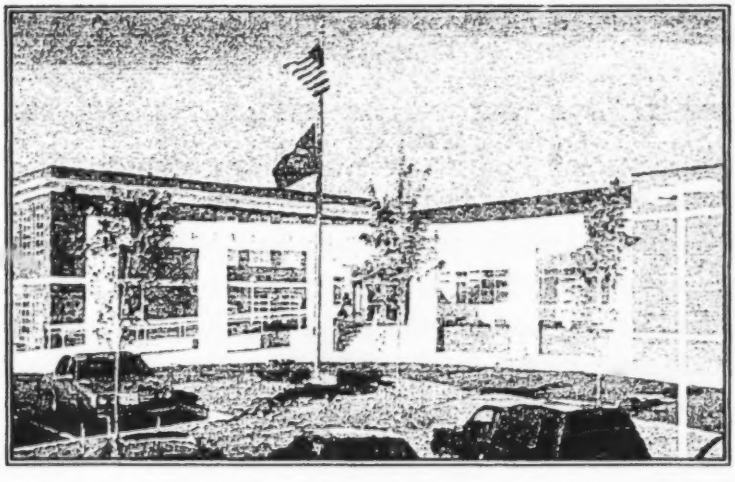

Figure 4-15. Entrance to Barrett Elementary

Architecture can also be used to distinguish between and provide unique identities for spaces within the school. Ben Graves provides an example of how this was applied to the design of a new high school,

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Townview Magnet School in Dallas, Texas, which consolidated six magnet schools onto one campus.

> There were six schools – law, social services, science and technology, health professions, business, and gifted and talented – coming together on one site. We broke down the walls that people were building up trying to protect their own turf. But, at the same time, we required the architect to give identity to each of the magnet programs.

The design response was to use repeating patterns of colors, textures, and materials throughout the school in combination with prominent cases displaying students' work.

> You knew when you left one magnet area and entered another. When you walked down the hall, you knew when you had entered the science and technology magnet area. You knew when you enter the law enforcement area. But, at the same time, you were also conscious that [the area you were in was] part of a bigger school.

The design created six distinctly individual areas linked to one another through program and design.

Architecture can be used to indicate the activities and behaviors appropriate for spaces. On the playground, the landscaping and equipment invite children to run and climb. In the library, the muted carpeting, heavy furniture, and stacks of books invite students to sit quietly and read a book. Throw pillows against a wall invite children to relax with their book on the floor.

Henry Sanoff's designs for preschool "playrooms," which are divided into learning centers for discrete activities, provide an example of how architecture can be used effectively in this manner. "The design and organization of those learning centers transmits signals to kids to tell them what the appropriate activity is." A "reading center," for example, would look different from a "dramatic play center."

> You can't write on the wall [of the reading center] "This is reading," because two-year-olds can't read. Kids enjoy reading on the floor. So, we would design the reading center with lots of cushions, big foam pads, where, when [the students] pass by, [they] want to walk in, pick up a book and look at the pictures.

That would be very different from the dramatic play area where kids dress up and pretend.

> It would be designed so that [the area] sends out signals to the kids that this area is a place for play. There would be lots of costumes. There might be mirrors where the kids could see themselves. Lots of props. Lots of materials.

Sanoff continues, "You can't continuously tell children, 'This is an inappropriate activity.' " The physical environment has to send the proper messages. He describes how design can help control children's behaviors and indicate to them what is appropriate conduct for the playroom.

> Teachers talk about "quiet feet" and what they mean is that kids shouldn't be running around. It is disruptive. Well, children will only run if there is a race track to run. But, if you plan the playroom carefully, you can plan in such a way that there are no straight runs. So, you don't have to discourage children from running because the physical environment tells them that they

> can't. The teachers don't have to [spend all of their time being] disciplinarians.

In all of the ways described by Crumpacker, Graves, and Sanoff, well designed architecture can make known information sought by a building's occupants. By indicating the arrangement and function of spaces, identifying learning environments, and signaling the appropriate behaviors and activities for those environments implicitly through design, architecture can eliminate much of the "environmental noise" caused by the overuse of signs and, ultimately, make the experience of being in a school less tiresome and more enjoyable.

As a Textbook

> *...the walls, the windows, the doors, the structure, the [campus] design, can all be part of a landscape designed for learning. The architecture itself can become a three-dimensional tool for teaching.*
> – *Anne Taylor*

The perception of architecture as a textbook is one in which architecture communicates meaning and understanding, either implicitly or explicitly, through its design. Applied to education, the architecture reinforces the curriculum and helps make the learning experience more meaningful. It can do so passively through the presentation of examples, as with the display of cultural artifacts that are part of a social studies curriculum, or actively as the basis for learning, as with the teacher who

has students engage their environment to provide a meaningful context for lessons learned. Teachers and students can look to the built environment for examples of order, balance, symmetry, asymmetry, hierarchy, rhythm, repetition, transformation, form, space, volume, scale, and many other intracurricular themes.

The use of architecture in this manner is uniquely applicable to education; however, many people, educators and architects among them, question its applicability. A young intern at one of the architecture firms visited by the researcher responded in a typical manner when presented with the possibility, "A building can't teach. Perhaps one of Mies van der Rohe's buildings, but a school?! I don't think so." Such a response is indicative of a prevailing attitude characterized by an indifference to, rather than a responsibility for, the built environment in which the potential of the medium goes largely unrecognized.

However, according to Henry Sanoff and others like him who believe that architecture can be used to reinforce the curriculum, "the potential is phenomenal." Using architecture as an integral part of the curriculum, as opposed to simply accommodating it, not only serves to make the education more meaningful by grounding it within a tangible context, but it also helps sensitize students to their surroundings and encourages them to be more active in taking responsibility for it.

Basil Castaldi provides an example of how the architecture can be used passively to reinforce and promote science curriculum.

> Science labs have storage space. Why couldn't the architects, instead of building storage cabinets above counters, design storage/showcases in the corridor to display the science equipment? The teacher could put equipment in the showcase with a description underneath saying what that piece of equipment is. [They] can show it. There it is. It's stored. It'll be used. But, it allows the equipment to be out on display at the same time.

Sara Crumpacker describes how Bob Moje takes this a step further in his design for an *interior* window at Venable Elementary School in Charlottesville, Virginia, by actually displaying the building's mechanical system.

> One of the things [Bob] did was put a window in the hallway [where the kids line up to enter the cafeteria], just a big window, that looks down at the boiler room of the school. In doing so, he exposed the pipes and parts of the building's mechanical system so that the kids can really see what's keeping them warm and how it operates.

The pipes are labeled with placards to indicate their functions (e.g., heat exhaust, heat return, ventilation, drinking water, sewage, etc.), and each is painted a unique color. Figure 4-13 shows children at Venable looking through this window at the pipes beyond (VMDO, 1996).

Figure 4-16. Interior Window at Venable

Architecture can promote learning by continually providing students with fresh perspectives from which to view their educational experience. Students, especially elementary school students who may spend up to five or six years in the same school building, can become desensitized to or bored with their environment. This could lead to feelings of apathy or resentment that may ultimately manifest themselves in the students, in terms of uninspired academic performance, or in the schoolhouse, in terms of destructed property. Bob Moje explains that by using architecture to provide a variety of sensory stimuli, students can continually rediscover and reengage their experience, reducing the potential that they will lose interest in it.

> The building itself is a powerful teaching tool and an expression of what [the teachers] are trying to do. Just the simple use of forms,

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> colors, textures, etc. will give [the students] different ways of experiencing the building. For example, the way [the architect] introduces natural lighting will affect how [the students] react and develop.

For example, Moje, in his design for Broadus Wood Elementary School in Charlottesville, Virginia, created windows at varying heights so that children would be given different views as they grew older and taller. The experience of watching the season change through these windows would be a new one each year. Variation was also created using colors and materials in differing combinations at different places within the school "...so that there are themes and rhythms going through the building [for the students] to look at and understand differently as they progress through their time [at Broadus Wood]."

Some educators and architects feel that architecture can go beyond displaying examples and providing stimuli and become an active part of the curriculum. Henry Sanoff began a Designer in Residence program that paired architects with teachers in schools.

> The idea was for the teacher to establish objectives and for the architect to figure out a project [involving the environment to] which would fulfill those objectives. Then the architect would come visit the school when the kids were doing the project.

For example, a walk across the campus might become the basis for a creative writing exercise. Any of a number of things spotted along the way might serve as a catalyst. "So, the kids were becoming sensitive to

the environment and satisfying the teacher's requirement of learning to write at the same time," says Sanoff.

To help make this more feasible, Sanoff suggests that teachers be more involved in the process of designing schools to ensure that the learning environments created compliment their curricula. "A science teacher, for example, would get involved in the program planning and suggest animal areas, nature trails, and other things that [would reinforce what and how he/she plans to teach]."

Anne Taylor has developed a formal curriculum using architecture as the foundation for learning. "It's an integrated, interdisciplinary curriculum in which we have examined all the concepts and knowledge bases of the disciplines." The Teacher's Guide supplementing the curriculum begins with an example of how the architectural concept of balance can be used to help understand the concept of balance as it relates to math, life sciences, physical sciences, social studies, visual arts, dance and movement, physical education, and philosophy (School Zone Institute, 1991). Taylor remarks,

> You take an environment and most people don't see it. But, all the things that we're teaching them about geometry in math, the physics of structure, ecology, botany, you name it, [are present in the environment around them].

One lesson, entitled "You Are Architecture," from the Teacher's Guide is designed to help students understand how their bodies function

by using a building as a metaphor for their body. Figure 4-14 is an illustration taken from this lesson (School Zone Institute, 1991).

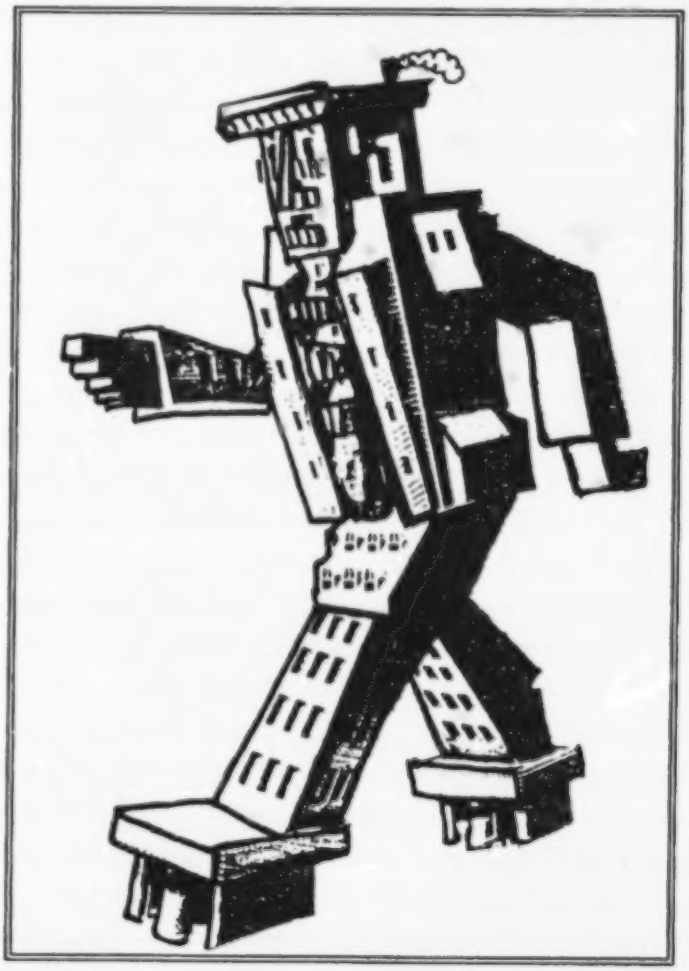

Figure 4-17. Building/Person from Lesson Seven

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The students make comparisons between parts of their body and parts of a building. For example, they compare their skin to a building's envelope and consider how they both protect, they compare their cardio-vascular system to a building's heating system and consider how they both circulate, they compare their lungs to a building's windows and consider the importance of breathing, they compare their central nervous system to a building's electrical system and consider how they control functions, and they compare their skeletons to a building's structural system and consider how they support. The students also are asked to consider ways in which their bodies differ from a building.

> If teachers are trained to teach using the environment and architects design appropriately, then the environment can come alive as "a three-dimensional textbook so that kids are learning from the environment, not textbooks!"
>
> So, the *Architecture and Children Program* is a design education program where we are starting to get people to think visually, spatially, and aesthetically. And I happen to use the environment as the design educator of human patterns and nature, design and nature, to get kids really interested in what they are looking at. It's all math, it's patterns, it's packaging, it's serration, it's, you know [laugh]... [everything].

The application of architecture as described by Castaldi, Crumpacker, Moje, Sanoff, and Taylor is not only useful in that it promotes the overall educational goal, but it performs an important social function as well. Most people, having grown accustomed to the comfortable shelter provided by buildings, tend to take for granted the environments in which they work, live, and play every day. Only when a

building stops performing as expected (e.g., the roof leaks or the air conditioner stops working), do they stop to take notice, and only then will they take steps to alter their environment.

One explanation for this may be the fact that often people have never been introduced to, become acquainted with, or taken responsibility for their physical surroundings. In fact, people, in many cases, are discouraged from altering their environment. This is certainly the case in schools where teachers are typically assigned with little or no choice to any one of many uniform classrooms. Students, whose environment is often reduced to one of many desks, learn very early in life to accept their surroundings as is, which affects the responsibility they feel toward the built environment in general. Incorporating the environment into the learning process helps students become aware of their environment and encourages them to take responsibility for it.

As an Agent

> *There's a real opportunity for architects to begin to look at school buildings and use school design as a way to change our educational system.*
>
> – *Henry Sanoff*

The perception of architecture as an agent is one in which the architecture in which architecture is used to affect change. Applied to

education, the architecture encourages and provides opportunities for change in the method of instruction chosen by teachers or approach to learning taken by students. This can occur subtly by providing an array of possibilities within the environment that might invite change, or not so subtly by imposing an environment that forces change.

This perception about the role of architecture is perhaps the most controversial. Several informants reacted strongly against the suggestion. Hunter Barnes stated that, "it would be very difficult for architecture to take the lead." Basil Castaldi was even more adamant saying,

> I think there is where some architects get into trouble. They think they can be educators. They all went to school so they think they know education. But, unless the architect has gone through [a college of education], has taught school, and knows what the problems are and so forth and so on, he should not get into the business of curriculum.

Al Reaser agrees,

> I'm appalled at the number of people who hire architects and let them push the program and [determine] what the division is going to do. I hire an architect who will design the building that will match our programming. If [the architect] has preconceived ideas (and that comes out very clearly in the interview), then [I will not hire] the architectural firm.
>
> Twenty years ago architectural firms came in and told you how to build your building. If that happens now, there's only one person who's at fault and that's the owner who would hire them and put up with that.

The concerns expressed by Barnes, Castaldi, and Reaser are legitimate. Certainly it would seem as implausible for an architect without proper training to design curriculum as it would for an educator without proper training to design a building. Even those who hold this perception are not likely to argue that. What advocates for the use of architecture as an agent for change are more likely to say is that architecture is not living up to its potential and, as a result, education is suffering. Senator Carol Moseley-Braun, sponsor of the Education Infrastructure Act, stated in an interview, "I firmly believe that emerging education reforms are doomed unless we house them in environments that are conducive to learning" (from an interview with Moseley-Braun, AS&U, June 1994). The implication is that if architecture does not change, then education cannot either.

According to Sanoff, stagnant architecture creates, "enormous barriers."

> Chairs aren't bolted to the ground any longer, but when a teacher walks into the typical classroom and it's regular shaped with chalk boards at one end and desks at the another other, the [environment] is sending out messages to the teacher about what the appropriate method of delivery is, [that being a teacher standing in front of a group of students] to lecture.

In this setting, the teacher is in no way encouraged to change.

Bruce Jilk would agree. In an interview (Shields, 1993) he stated that he "...believes the instructional design of almost all older schools is

no longer consonant with the blueprints for post-modern education." This belief addresses the difference between traditional instructional design and newer constructivist educational philosophies. He feels personally that "for learning to be authentic for students, they need to be participants. And so, students design and manage their own learning." The typical learning environment discourages this constructivist approach to learning, dictating instead, as Sanoff described above, a learning environment that is more conducive to instructional design where, according to Jilk, "the teacher is designing that learning process, doing the spoon feeding."

The suggestion then is not that architecture should change education, as objected to by Barnes, Castaldi, and Reaser, but rather that architecture must change if education is going to and that change will necessarily affect education. In order for this to occur responsibly, both Sanoff and Jilk recognize the need for educators and architects to work in concert, each bringing to the design process their own unique set of skills. According to Sanoff,

> Architects are going to have to change the way in which they work with school districts. There will have to be more participation involving the kids and the teachers. That means that more architects must have more confidence in opening up the process. I think a lot of problems can be solved if the whole process of designing schools can change. Then there could be some very promising results.

Questions Raised by the Analysis

Because no single metaphor describes architecture's role completely and because each metaphor describes a unique contribution to be made by the architecture, it is questionable why school design does not necessarily incorporate all metaphors.

CHAPTER FIVE

Discussion

Summary

Conversations with informants centered around the role of architecture in education. Informants provided examples of how architecture *could* detract from the educational experience (e.g., by providing an unprotected, depressing, poorly designed or otherwise unfit environment), but almost all stated directly that what it *should* do is "enhance" the teaching and learning experience. Five metaphors describe ways in which informants perceived that architecture can enhance education.

Architecture as a Facilitator

> *Architecture first is shelter. We shouldn't forget that.*
> *– Henry Hiner*

> *When we hire an architect, I try to instill in them just two simple, basic facts. If the roof doesn't leak and if the heating and air conditioning work, then that is 95% of the problems associated with the building conquered.*
> *– Al Reaser*

The perception of architecture as a facilitator is one in which the architecture makes possible the education by, very generally, accommodating enrollment, housing and supporting the curriculum, and controlling environmental factors that might detract from the educational process. This is a perception that has a high regard for utility and economy, the quotient of which is efficiency.

Architecture as a Place

> *One of the things that I'll always remember is once, when I was back visiting a school that we had designed, a child who was moving brought her grandparents back to her school to have her picture taken in front of it as her last act before leaving. She was literally hugging one of the columns in front of the school.*
>
> *That she wanted a picture of herself at her school so that she could always remember it, really reinforced for me that, while functional aspects are important, the images of schools, the places where they learn, is something that leaves an indelible mark on children.*
>
> *– Bob Moje*

The perception of architecture as a place is one where the architecture creates learning environments in which students gain a sense of identity, the educational process becomes meaningful, the educational experience becomes exciting, the school is made to seem inviting, shared sensory memories are possible, and the members of the educational community are made to feel secure and at home. This is a perception that places a high value on the everyday lives of people.

Architecture as a Signpost

There are ways to determine direction other than pointing a sign. Part of that is the size and shape of an opening. Is it large enough? Does it look like the first place you would go because there is a big arch there? Or is it just a little bitty doorway?

– Sara Crumpacker

The perception of architecture as a signpost is one in which the architecture makes apparent the relative importance of spaces within the school, provides a clearly understood pattern of circulation, denotes which activities occur within which environments, and signals which behaviors are appropriate for activities in their respective environments. This is a perception that has a great appreciation for the ability to making intuitive that which might otherwise be counter-intuitive.

Architecture as a Textbook

...the walls, the windows, the doors, the structure, the [campus] design, can all be part of a landscape designed for learning. The architecture itself can become a three-dimensional tool for teaching.

– Anne Taylor

The perception of architecture as a textbook is one in which architecture reinforces the curriculum and helps make the learning experience more meaningful. This is a perception that believes strongly in taking responsibility for the built and natural environment.

Architecture as an Agent

> *Stop trying to reform people. Reform the environment and the people will reform themselves.*
>
> *– architect Buckminster Fuller*
> *cited by Bruce Jilk*

> *There's a real opportunity for architects to begin to look at school buildings, the school design, as a way to change our educational system.*
>
> *– Henry Sanoff*

The perception of architecture as an agent is one in which the architecture is used to affect change. Applied to education, the architecture encourages and provides opportunities for changes in the method of instruction chosen by teachers or approaches to learning taken by students. This is a perception that respects the power of the medium.

Discussion

Each of the five metaphors suggests a different way in which architecture can play a role in education and in each case that role can be very significant. That begs the question, "Why would a school then not be designed with all of these metaphors in mind?" Two reasons emerged from the data. While the conversations were not focused on either of the reasons, their recurrence across conversations suggests

their importance. The first was in regards to concerns about funding and the second was in regards to a prevailing skepticism about architecture. The two are critical components of the debate.

Schools are tremendously expensive to build and maintain. Over the course of the 1994-1995 school year, school districts in the Commonwealth of Virginia spent $58,801,357 to construct nine new elementary schools (on average, $6,533,484 per school), $20,880,816 to construct two new middle schools (on average, $10,440,413 per school), $90,364,522 to construct four new high schools (on average, $22,591,130 per school), and $19,366,729 to renovate thirteen schools (Bosher, 1996). Richmond recently approved $10 million to renovate its city schools, but, according to Hunter Barnes, that money is a "bandaid" that will all be spent to repair "a leaking roof here or a leaking roof there."

With the cost of school construction rising at almost four times the rate of normal inflation over the last five years, obtaining funding for something as necessary as a school is, according to Hunter Barnes, very difficult.

> All schools are funded locally and to build anything you need dollars. And in a lot of these communities where the demographics have changed, the population is greying, and sixty or seventy percent of the people don't have children, the community doesn't want to see their taxes increased to build.

As Ben Motley points out, when funds are approved, they are rarely enough and they are often spent quickly.

> We work with some school divisions that are really struggling just to keep minimal types of facilities running. They would like to do so many things, but in the meantime they can't get enough money to repair the roof that's leaking.

Money must be spent "wisely." Therein lies the key. The general population varies on what "wisely" means, but the majority would go no further than to suggest it entails spending no more than what is needed for the basic operational necessities. The building should provide shelter and accommodate the curriculum, but extra expenditures beyond that are generally considered frivolous.

This is not to suggest that creating a meaningful context, intuitive design, learning environments that are a part of the curriculum, or architecture that encourages change is necessarily expensive, but the majority of taxpayers seem to think so. So great is pressure on superintendents, school board members, and/or district directors of planning accountable to taxpayers that, in some cases, good design is actually *discouraged* because it *looks* too expensive. Ben Graves provides a telling example,

> I was working on a project not long ago where the architect had done a very nice job with his design, and the client, at this point the superintendent, looked at the drawings and said, "It looks expensive." And the architect said, "Well, I didn't use any expensive materials, I just used some color." And the superintendent said, "Well, make it look cheap! It has to look cheap or our committee won't buy it. Make it look cheap!

One has to wonder why "the committee" would not buy it unless the design looked cheap. Part of the answer lies in the failure of research to link good design, which translates to many as "more money," to learning outcomes (See Review of the Literature). The rest of the answer may lie in the public's perception of architecture in general. As Anne Taylor points out, " 'architecture' is a very esoteric word" for which most people have little or no understanding, let alone an appreciation. Hunter Barnes continues this thought, "[Unless they have an architectural background], I don't think that the general public is sensitive to [architecture]. According to Ben Motley, "Unfortunately, I think our culture doesn't place a very high value on quality of architecture."

This reality, combined with the lack of research providing a correlation between design and learning outcomes, provides more than enough consensus and justification to oppose school designs that go beyond providing the basic essentials. Further, the dollars at stake make it even more easy to justify this perception on the basis of no funds. As Ben Motley concludes, "Ultimately the pressures of budget and schedule and things like that seem, so often, to take over." The net result is that most schools are content to be facilitator. In fact, with the difficulties that districts are having raising funds for necessary repairs, many feel fortunate if they can obtain and maintain an educational "facility."

That having been said, it is this researcher's belief that the more metaphors that can be incorporated into the design of the school, the richer the educational experience could potentially be.

Suggestions for Further Research

This research focused on ways in which the architecture could/should enhance the learning environment. Equally valuable would be research identifying ways in which architecture can detract from the learning experience. Identifying such detractors could eliminate some of the barriers that are preventing architecture and education from working together toward the best possible learning experience.

Also of value would be research that explores the process by which schools are designed. It was clear in talking to the informants that the method by which they were involved in designing schools greatly affected the final product. If processes could be identified as generating certain types of schools, those schools could be evaluated, processes could be reinforced or amended, and the barriers that prevent even one perception, even one metaphor, from being included could be eliminated.

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APPENDIX A: CORRESPONDENCE

Letter of Contact

Bureau of Educational Research
University of Virginia
405 Emmet Street
Charlottesville, Virginia 22903

<Field:Date>

<Field:Name of Recipient>
<Field:Position>
<Field:Place of Business>
<Field:Street Address>
<Field:City, State ZIP>

Dear **<Field:Name for Salutation>**:

My name is Bill Bradley. I am a graduate student in the Curry School of Education at the University of Virginia currently writing my dissertation. The topic of my research is, "The role of architecture in education," and I am interviewing educators, architects, and consultants who influence school house design to learn more about their perceptions about the current status, future direction, and potential of architecture as a partner in the educational process.

Your firm was called to my attention as being a firm dedicated to schoolhouse design. As such, I would like very much the opportunity of scheduling a half hour interview to speak with you about your thoughts on this topic. Would this be possible?

I will call your office during the week of February 12th. If you will be available for an interview, I will schedule an appointment at your convenience then. If it will not be possible to meet with you, is there perhaps someone else at your firm with whom I might speak?

Thank you for your consideration.

Sincerely,

W. S. Bradley
wsb5c@curry.edschool.virginia.edu

Letter of Confirmation

Bureau of Educational Research
University of Virginia
405 Emmet Street
Charlottesville, Virginia 22903

<Field:Date>

<Field:Name of Recipient>
<Field:Position>
<Field:Place of Business>
<Field:Street Address>
<Field:City, State ZIP>

Dear **<Field:Name for Salutation>**:

I am pleased that you will be able to participate in my doctoral dissertation. Your background and experience in schoolhouse design will lend themselves well to my research.

When we speak on **<Field:Month, date>**, I would like to converse with you for half an hour about your perceptions about the role of architecture in education. My main question to you will be, "How would you describe the role of architecture in education?" This question is intentionally broad to allow you to respond with whatever information you feel is germane to the topic. As you reflect on it in the days prior to our interview, I would ask that you consider, in particular, the current status, future direction, and potential of architecture as a partner in the educational process.

Enclosed you will find two items: a formal Statement of Informed Consent and a Request for Informant Information. Please read and sign the Statement of Informed Consent and complete the Request for Informant Information. Both can be returned to me via the enclosed self addressed, stamped envelope. If you have any questions, please call me at (804) 589-3344 or e-mail me at the address below. Thank you.

I look forward to speaking with you on **<Field:Day>** **<Field:morning/afternoon>** at **<Field:time>**.

Sincerely,

W. S. Bradley
wsb5c@curry.edschool.virginia.edu

Enclosures: Statement of Informed Consent
Request for Informant Information
stamped envelope

Statement of Informed Consent

This research is being conducted to fulfill the dissertation requirement for the degree of Doctor of Philosophy for William S. Bradley. Its purpose is to examine the role of architecture in education. Data will be collected via interviews with informants, namely educators, architects, and consultants influential in the field of schoolhouse design. This Statement of Informed Consent makes explicit the shared expectations of the researcher and informant.

The informant will be interviewed by Mr. Bradley. With permission, interviews will be tape recorded and transcribed into an electronic database. Prior to analysis, the informant will be provided with a completed transcription to verify its authenticity, check for accuracy, and make revisions that reflect changes in perceptions that may have occurred since the initial interview. Any annotations or revisions submitted by the informant will be entered into the database by Mr. Bradley. This new, revised database will be considered an accurate representation of the informant's perceptions and serve as the primary medium for analysis.

Because the information gathered is not likely to be sensitive and because the informant's position in the field of schoolhouse design will lend credibility to the research findings, no attempt will be made to conceal the identity of informants. If, however, an informant would feel more comfortable maintaining anonymity, arrangements will be made for doing so. (If you, the informant, prefer to remain anonymous, please state so in the space provided and initial.) _____

_____

_____ initial _____

Data will be analyzed by Mr. Bradley. Analysis in the form of a formal dissertation will be submitted to the faculty of the University of Virginia. If accepted, the dissertation will be published. Informants will be notified of other papers and presentations stemming from this research before they are submitted for review.

(Please add any further expectations that you may hold in the space provided.)

_____

_____

_____ initial _____

By signing this statement, Mr. Bradley agrees to conduct this research in an ethical manner, adhering to the provisions stated above. By signing this statement the informant agrees to allow the interview to be tape recorded and transcribed, to verify authenticity of transcriptions, and to complete the attached Request for Informant Information.

Interviewer's signature _____ Date _____

Interviewee's signature _____ Date _____

Request for Informant Information

1. Name: _____ E-mail: _____
2. Occupation (title most relevant to schoolhouse design): _____
   _____

3. Based on your background and experience in schoolhouse design, would you consider yourself to be an educator, architect, or consultant? _____

4. On what area(s) of schoolhouse design, if any, do you focus (e.g., elementary schools, curriculum theory, design philosophy, design process, innovative application, etc.)? Please elaborate: _____
   _____
   _____
   _____

7. Please list articles or books you have published or designs you have completed to which I might refer to gain a better understanding of your perspective:
   _____
   _____
   _____
   _____
   _____
   _____
   _____

8. Please complete the following statement:

   If, generally speaking, churches are designed to inspire, factories are designed to produce, and shopping malls are designed to sell, then schoolhouses *should be* designed to _____.

Thank you for completing this form. Please return it along with the informed consent in the self-addressed, stamped envelope provided.

Request for Member Checking

Bureau of Educational Research
University of Virginia
405 Emmet Street
Charlottesville, Virginia 22903

<Field:Date>

<Field:Name of Recipient>
<Field:Position>
<Field:Place of Business>
<Field:Street Address>
<Field:City, State ZIP>

Dear **<Field:Name for Salutation>**:

As promised, here is a transcript of our recent conversation. Please take time to review it, verify its authenticity, and make *any* editorial changes you like before returning it to me. I emphasize *any* because, ultimately, my goal is to obtain a clear understanding of your perceptions about the role of architecture in education. If, for some reason, the transcript does not reflect your views, feel free to amend it by adding or subtracting whatever information is necessary to make your perceptions more explicit.

I am currently in the process of writing an informant sketch that highlights your contributions to the field of schoolhouse design. When this is complete, I will send you a draft for review.

Again, thank you for taking the time to speak with me. **<Field:informal statement>**

I will look for the edited transcript in the mail in the next couple of weeks. If I have not received it from you by **<Field:15 days>** I will assume that you found it acceptable and will proceed with my analysis using the original version. Feel free to contact me with any questions you have.

Sincerely,

W. S. Bradley
wsb5c@curry.edschool.virginia.edu

Enclosure: transcript

APPENDIX B: INTERVIEW PROTOCOL

Interviews will be conducted with informants to establish their influence on the field of schoolhouse design and to gain a better understanding of their perceptions about the role of architecture in education. The questions outlined below are designed to solicited the necessary information.

"What I would like to do today is talk for ten minutes about your influence in the field of schoolhouse design – your formal background, set of experiences, and contributions – and then spend the reminder of our time talking about your perceptions about the role of architecture in eduction...."

I. Influence of Informant

A. You indicated on the Request for Informant Information that you have been involved in the field of school design for _____ years. How did you first get involved/interested in this area?

B. What are some contributions that you consider highlights of your work in schoolhouse design?

C. You listed your current title relevant to schoolhouse design as _____. Could you tell me about projects in which you are currently involved?

D. Other questions generated from the Request for Informant Information.

Thank you. I'd like to switch the focus now and talk about your perceptions about the role of architecture in education. If you think of anything else that you would like to include about your background or experiences as we talk, feel free to add them.

II. Perceptions About the Role of Architecture in Education

A. Do you think that architecture has an affect on education?

- How do you define "architecture"?
- How do you define "education"?

B. How would you describe the role of architecture in education?

- In what ways does the built environment affect the teaching and learning experience?
- Do you have a metaphor that describes the relationship between the built environment and the educational process?

C. At the bottom of the Request for Informant Information you stated that "school buildings *should* be designed to _____." Could you elaborate on that?

- Please tell me about some schools in which you have seen this occurring.
- Has it been your observation that schools *are* being designed with this in mind?
- How *are* schools being designed? (How *is* architecture being used in schools?)

D. As the twenty-first century approaches, how do you see the role of architecture changing in the future?

- How will widespread integration of computers into the classroom affect the role of architecture in education?

Thank you. Is there anything that you would like to add?

APPENDIX C: CODING GUIDE

The following codes were assigned to meaningful chunks of data:

influence (last name of informant) - This code is applied to text that helps establish the informant's influence on the field of schoolhouse design (e.g., education, professional experiences, awards, publications, and how they first became interested).

role [last name of informant] - This code is applied to text that indicates the informant's perceptions about what the role of architecture in education should be.

current [last name of informant] - This code is applied to text that indicates the informant's beliefs about the role that architecture currently plays in education (i.e., how are schools designed today).

future [last name of informant] - This code is applied to text that indicates the informant's perceptions about the future role or direction of architecture in education.

facilitator - This code is applied to text that suggests that architecture should facilitate the educational process (i.e., the learning environment is a functional one).

place - This code is applied to text that suggests architecture should create a sense of place (i.e., the learning environment provides a sense of identity, meaning, and security).

signpost - This code is applied to text that suggests the architecture should communicate implicitly (e.g., the hierarchy of space, the circulation, the activities and behaviors appropriate for a learning space).

textbook - This code is applied to text that suggests the architecture should become an integral part of the curriculum (i.e., the learning environment should presented with opportunities to incorporate the environment into lessons).

agent - This code is applied to text that suggests the architecture should be used as an agent for change (e.g., the learning environment encourages exploration, advocates educational reform, etc.).

money - This code is applied to text in which issues of budget are discussed

skepticism - This code is applied to text in which the general public's skepticism toward, or lack of understanding about, architecture are addressed.

quote [last name of informant] - This code is applied to text that the researcher thinks may be used as thick description and lends meaning to the analysis.

teacher usage - This code is applied to text that indicates how teachers (or educators) use (or do not use) the built environment (e.g., examples of teachers manipulating their environment or using it as part of a lesson calls for the need to sensitize teachers to the potential of the environment because they seem to be unaware, etc.).

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Sign here, → please

Signature: W. S. B	Printed Name/Position/Title: WILLIAM S. BRADLEY / ARCHITECT
Organization/Address: VMDO ARCHITECTS, CHARLOTTESVILLE, VA	Telephone: 434·296·5684 FAX: 434·296·4496
	E-Mail Address: bradley @ vmdo.com Date: 8·17·02

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